serial
720

C. L. MARTIN'S
LIBRARY.

Digitized by the Internet Archive
in 2026

https://archive.org/details/commisionerofpat0000vari

1

2

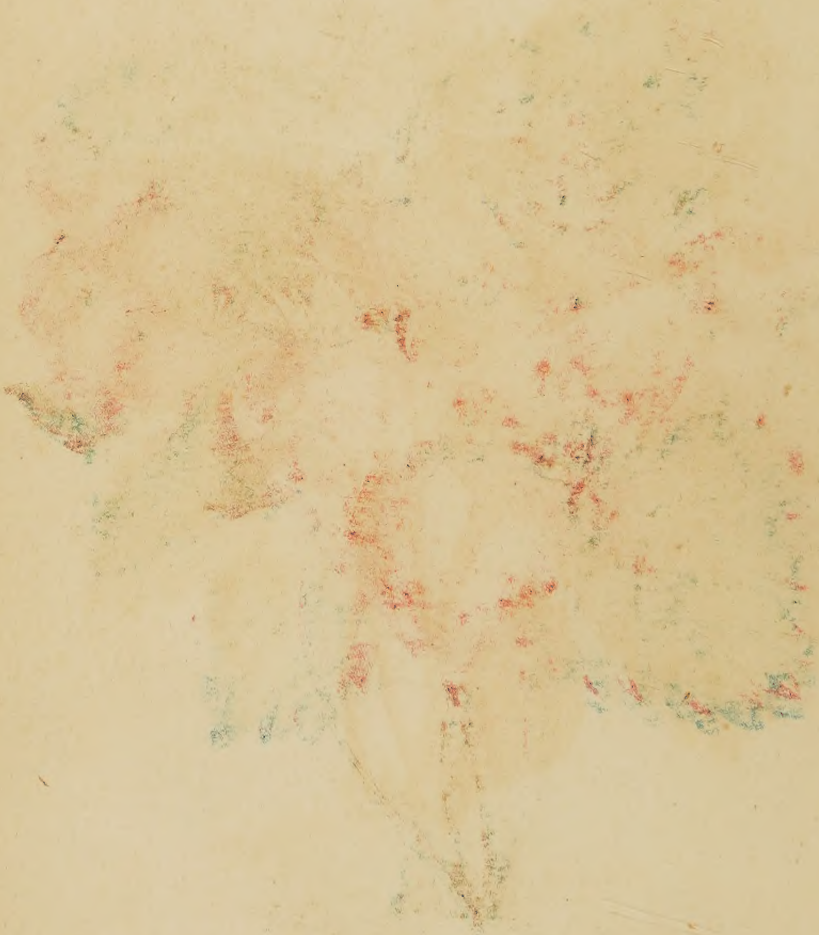
3

4

5

Lith. & print. in colors by A. Hoen & Co. Balto

HOVEY SEEDLING



EARLY SCARLET.

Lith. & print. by A. Hoen & Co. Balto.

Wild Corn. Rice Corn. Pop Corn. Pure Canada Corn.

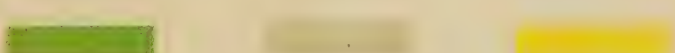
King Philip Corn. Improved King Philip Corn. 12 Rowed Dutton Corn.

Golden Sioux Corn. R.I. White Flint Corn. Pennsylvania White Flint Corn.

New Mexican White Flint Corn. Canada Blush Corn. 12 Rowed Blood Red Corn.

New Mexican Black Corn. Tuscarora Corn. Stowell Late Green Corn.

Yellow Gourd Seed Corn. Improved Blue Pearl Corn. White Gourd Seed Corn. Improved White Gourd Seed Corn.



Phosphates. Dextrine & Starch. Oil Gluten & Starch.

Lith & printm colors by A. Koen & Co. Balt.

33d Congress,
1st Session.

[HO. OF REPS.]

Ex. Doc.
No. 39.

REPORT

OF THE

COMMISSIONER OF PATENTS

FOR THE YEAR 1853.

AGRICULTURE.

WASHINGTON:
A. O. P. NICHOLSON, PRINTER.
1854.

LETTER

OF THE

COMMISSIONER OF PATENTS,

COMMUNICATING

The Agricultural portion of the Report of that Office for the year 1853.

MARCH 20, 1854.—Referred to the Committee on Patents, and ordered to be printed; and a motion to print 25,000 extra copies referred to the Committee on Printing.

MARCH 21, 1854.—*Resolved*, That there be printed by the printer of the House 100,000 extra copies of the Agricultural Report of the Commissioner of Patents, for the use of the members of the House, and 10,000 for the use of the Patent Office, together with the plates.

UNITED STATES PATENT OFFICE,
March 20, 1854.

SIR: Agreeably to the design of Congress, as indicated by the appropriation of the 3d of March, 1853, for the collection of agricultural statistics and purchase of seeds, I have the honor to submit herewith the agricultural portion of my annual report.

I am, sir, very respectfully, your obedient servant,

CHARLES MASON, *Commissioner.*

Hon. LINN BOYD,
Speaker of the House of Representatives.

PRELIMINARY REMARKS.

In the preparation of this volume, as well as in the other duties incumbent upon this Bureau, it has been the object to promote, as far as practicable, the paramount interests of the farmers and planters of the United States in the improvement of their crops and live stock; the introduction of new and valuable products; the amelioration of the exhausted and unimproved soils of the States lying along the seaboard and the Mexican gulf; in developing the agricultural resources of those bordering on the Pacific, the Mississippi and its tributaries, the Great Lakes, and the Canada frontier, thereby producing larger quantities, and of better quality, of our chief staples for export and domestic use.

In order more effectually to carry out the objects in view, various circulars have been sent to proper individuals in this country, as well as to our diplomatic and commercial agents, missionaries, officers of the navy, and other public functionaries abroad, for the purpose of disseminating and eliciting agricultural information, and for the procurement and distribution of cuttings and seeds. Through some of these agencies a species of "reciprocal exchange" of seeds, &c., has been established, and partially carried into effect, with all the principal countries of the globe.

Among the foreign products which have been more recently introduced and distributed, and which appear to be adapted for profitable cultivation, we would instance the Cuba tobacco seed from Vuelta de Abajo; the alfalfa from Chili; peas from Japan; frijoles, or turtle-soup beans, from Mexico; butter beans from Russia; duorra corn from St. Martin; cotton seed from Navigator's island and Cape Haytien; winter rape from France; and quinoa from Peru. Among those of indigenous growth, which have been selected and distributed in reference to their superior qualities, as well as to their probable adaptedness to certain parallels and localities, there may be noticed, among the corn, the jet black and the white flint varieties of New Mexico; the improved King Philip of New Hampshire; the mammoth sweet of Connecticut; the sugar corn of Pennsylvania; Stowell's late green of Ohio; the large yellow-gourd seed of Kentucky and Missouri; the Oregon of the District of Columbia; the improved white-gourd seed of Virginia; the Ward corn of North Carolina, and the Canada blush from New York;

also, the wild pea of Oregon; the purple clover, the potato, and bald barley of California; the wild plum of New Mexico; tea nuts of South Carolina; Persian walnuts of Washington and Virginia; and the fowl meadow grass of Maine.

Among the products proposed to be introduced from abroad, are rice and the soja bean of Japan, the latter of which is used for making the celebrated "Soy sauce;" wheat and barley of Australia, Chili, Mexico, the Cape of Good Hope, Teneriffe, Poland, Bavaria, the Dardanelles, Egypt, Algeria, Sicily, Majorca Iviça, and the south of Spain; spelt, vetches, lentils, and spurry of Prussia; winter flax, for autumn sowing, of Russia; furze, for prairie hedges, of England; the sainfoin of France; the carob tree, white lupin, chick pea, chufa, grass hemp, and melons of Spain, the latter of which are proverbial for their sweetness, and one variety for the property of winter keeping; the Gondar and Ifat cotton of Abyssinia, growing to the height of 8,000 feet above the sea; the Kaddack cotton of Cashmere, noted for its hardy growth; the rose apple of St. Helena; the jujube plum, pistacio nut, and sweet-acorned and cork-barked oaks of Algeria; peach-stones of New Zealand, Buenos Ayres, and Teneriffe, famous for the large size and lusciousness of the fruit; apricot stones and strawberry seed of Chili, which grow to an enormous size; the deodar cedar, walnut, Sinhara, or edible water nut, and the crocus saffron of Cashmere; and the seeds of the yerba maté or tea of Paraguay.

In connexion with this Bureau, an agricultural or industrial cabinet has been commenced, and already contains numerous varieties of seeds, insects injurious to vegetation, models, paintings of animals, &c. Among the seeds are samples of Indian corn, in the ear, from more than one hundred different localities between Maine, New Mexico, and the far West, which are regarded with interest, not only from their variety, but for their utility in serving as guides in the selection of seeds. Similar collections would also prove useful of our Cereal grains, rice, tobacco, cotton, hemp, flax, as well as the seeds and products of other plants and trees; or samples of silk, wool, cochineal, soils, natural and artificial fertilizers, and models of agricultural implements and machines.

CONTENTS.

DOMESTIC ANIMALS.

Horned Cattle—Cashmere, Scinde, and Malta Goats—Dairies—Horses, Asses, and Mules—Sheep—Wool—Swine—Etherization of Animals—Importation of Camels—Striped Gopher, or Prairie Ground Squirrel, of Wisconsin—Importation of Skylarks—Importation and protection of useful Birds—Poultry and Eggs—Bees—Wax—Honey—Silk. Page 1.

FERTILIZERS.

Guano—Bone-dust—Turners' shavings—Lime—Superphosphate—Gypsum—Salt—Ashes—Stable and barnyard manure—Clover—Straw—Swamp and pond muck—Sawdust. Page 79.

IMPROVEMENT OF LAND.

Meadows—Corn Land—Ploughing. Page 89.

BREAD CROPS.

Indian Corn—Wheat—Rye—Barley—Oats—Buckwheat—Rice—Potatoes—Potato Disease. Page 96.

TEXTILE AND FORAGE CROPS.

Cotton—Investigation of its fibre—Circular—Replies—Cotton of India—Flax—Hemp—Osier—Grass, hay, and other fodder—Beans and Peas—Mexican Frijoles—Oregon Pea—Japan Pea—Cow Pea—Colza, or Rape. Page 178.

MISCELLANEOUS CROPS.

Sugar—Tobacco—Hops—Indigo. Page 231.

FRUITS, WINE, ETC.

Fruits of Centre county, Pennsylvania—Apples—Cider—Vinegar—Pears—Peaches—Apricots—Nectarines—Plums—Cherries—Quinces—Grapes—Wine—Blackberries—Currants—Gooseberries—Cranberries—Melons. Page 256.

CLIMATOLOGY.

Agricultural Climatology of the United States compared with that of other parts of the Globe. Page 327.

DOMESTIC ANIMALS,

BY D J. BROWNE.

In considering the social conditions of nations long congregated and civilized, and necessarily existing under the impulses of utilitarianism, it is not surprising that man, whether possessing a permanent abode, or having emigrated to a distant land, should become attached to those animals which have proffered to him their perfect obedience, sagacity, courage, strength, and other kind offices, and should regard them with admiration, gratitude, and even affection. Such, doubtless, was the case with most of the early adventurers who sought a new home on our shores, and brought with them those animals which would render them the most assistance or protection, and subserve the best purposes for labor, pleasure, clothing, and food.

Some of the principal facts relative to the introduction, increase, breeding, and management of the domestic animals of the United States will be found under their respective heads, as follows:

HORNED CATTLE.

The first cattle brought to America from Europe were imported by Columbus in his second voyage, in 1493. He left Spain as admiral of seventeen ships, bringing a collection of trees, plants, and seeds of various kinds, a number of horses, a bull, and several cows.

The Portuguese took cattle and swine to Newfoundland and Nova Scotia in the year 1553. Thirty years after, they had multiplied to such an extent that Sir Richard Gilbert attempted to land there to obtain supplies of cattle and hogs for his crew, but was wrecked.

Cattle and other domestic animals were brought into Acadia by M. L'Escarbot, a French lawyer, in 1604, the year that country was settled. In 1608, the French extended their settlement into Canada, and soon after introduced various animals.

The first cattle introduced into Virginia was previous to 1609. In 1610, Sir Ralph Lane brought cows to that colony from the West Indies. The same year an edict was issued prohibiting the killing of domestic animals of any kind on penalty of death to the principal, burning the hand and loss of the ears to the accessary, and twenty-four hours' whipping to the concealer. In 1611, Sir Thomas Gates

brought into the same settlement one hundred cows, besides other cattle. The number of horned cattle in Virginia in 1620, was about five hundred; in 1639, thirty thousand; in 1648, only twenty thousand, including bulls, cows, and calves.

The first cattle introduced into the Plymouth colony were imported by Edward Winslow in the ship "Charity," in 1624, consisting of three heifers and a bull. From other accounts, they came in the ship "Ann," which made her first voyage in 1623. In 1626, twelve cows were sent to Cape Ann, and thirty more in 1629. In 1627, the cattle and goats of the "Plymouth Company" were divided among the colonists in a manner to remain for ten years, the old stock to be kept for common, and the new animals to be appropriated to their own use. Among them are mentioned "black heifers," "black cows," "red cows," and a "white-backed cow." In 1629, one hundred animals were imported under the direction of Francis Higginson, formerly of Leicestershire, for the "Governor and Company of Massachusetts Bay in New England," among which were sixty or seventy oxen and cows. Most of the latter arrived safe. Owing to the loss of cattle by the Indians and wolves, and the expenses of importation and keeping, the price at first was so high as to put them beyond the reach of many of the colonists. A red calf, however, soon became cheaper than a black one, on account of the greater probability of its being mistaken for a deer and killed by the wolves. In 1636, when cows were so high as to be sold from £25 to £30 each, and oxen for £40 a pair, a quart of new milk or four eggs could be bought for a penny; a pound of butter for 6*d*; and a pound of Cheshire cheese for 5*d*.

The first cattle introduced into New Hampshire were from Denmark, procured by Captain John Mason and his associates, in about the year 1631 or 1632, to stock their plantations, and to become employed in drawing lumber. These cattle were of a large size and of a yellowish color. The calves were allowed to run with their dams at pleasure. Their owners were ambitious to be distinguished by the strength and size of their oxen, on which bets and prizes were often made. This breed of cattle remained pure and unmixed near Agamenticus, in Maine, down to about the year 1820. In 1645, they had so multiplied that one hundred oxen belonging to Mason's plantation, near Portsmouth, were driven to Charlestown, Massachusetts, and there sold for £20 a head. In 1652, the number of cattle in Charlestown was four hundred. In the inventory of Piscataqua and Norridgewock, in 1635, there were two bulls, twenty-four cows, twenty-two heifers and steers, and ten calves. In 1636, one hundred and sixty cattle were driven from Newton, Massachusetts, to Hartford, Connecticut, the emigrants feeding on their milk on the way.

The first importation into New Netherland was made from the island of Texel, in Holland, by the "Dutch West India Company," in 1625, comprising one hundred and three animals, consisting of horses and cattle for breeding. In 1637, an ox in that colony was worth from $32 to $56; in 1646, the price of a cow was from $20 to $48; a bull calf, $3 20; in 1650, a milch cow, with her second or third calf, was valued at $40. At this period of settlement, the West India Company

not only furnished each tenant with land, a house, barn, and farming implements and tools, but four cows, four horses, sheep, and pigs, for the term of six years, at the expiration of which he was required to return the number of animals received. The entire increase remained with each farmer, who was bound to pay yearly $40 and 80 pounds of butter, rent for the cleared land. Afterwards the cattle belonging to the company were distributed for some years among those who had no means to purchase stock.

Cattle were introduced into the settlements on the Delaware by the "Swedish West India Company," from Sweden, in 1627.

The first cattle introduced into Carolina were brought from England, by William Sayle, in 1670, to Old Charleston, on the south side of Ashley river. General Wade Hampton and Colonel William Singleton were both engaged in importing cattle, as well as horses, before the Revolution.

The Indians on the Red river, in Louisiana, possessed cattle as early as the year 1690.

Cattle were first brought to the Savannah settlement, in Georgia, by Oglethorpe, in 1732. Others were introduced into the same colony in 1735.

In 1750, the best dairy farms in Rhode Island contained upwards of one hundred cows, annually producing 100 loads of hay, and sold 13,000 pounds of cheese, besides butter, bullocks, and calves. On one farm seventy-three cows made 10,000 pounds of butter in five months. Two acres of good land sustained one cow.

In 1750, the French of Illinois were in possession of considerable numbers of cattle, horses, and swine.

In 1783, Messrs. Goff, Ringold and Patton, of Baltimore, sent an order to England for superior cattle, for the purpose of improving the breed in the United States; and in 1785, Mr. Patten, junior, carried a bull from that importation to Clarke county, Kentucky. Mr. Patton, senior, some time afterwards followed his son, taking with him another portion of the same lot of stock. This old bull, then eighteen years old, was sold at public auction for $133 33. Mr. Harrison, a brother-in-law of Mr. Patton, also carried a short-horned bull to the same county, in 1804. This is said to have been a very fine animal, and greatly improved the stock of that region. Messrs. Hutchcroft and Welton also carried another descendant of the short-horned stock to Kentucky from the same importation.

About the year 1797, a Mr. Heaton, of Dutchess county, New York, imported from England a short-horned bull, which was afterwards hired by General Morgan Lewis and others for public use in that county.

From entering at large and minutely on the circumstances connected with the importation of all the domestic animals brought into this country since the commencement of the present century, we are prevented as much by the want of the necessary information as by the immediate object and limited length of these papers. We will, therefore, leave the subject for a future occasion, after giving a short sketch of the other animals early introduced, and the statistics of the animals and their products exported at various periods of our history.

Among the early exports of cattle and beef from this country may be noted those shipped from Savannah, in Georgia, in 1755, which consisted of 16 steers and 40 barrels of beef. In 1770, there were exported from the same place 28 steers and cows, 639 barrels of beef, and 4,985 pounds of tallow. In 1772, there were shipped from that port 136 steers and cows. The amount of beef exported from Charleston, South Carolina, in 1747–48, was 1,764 barrels, besides 130 casks of butter; in 1754, 416 barrels; from Philadelphia, in 1752, 3,431 barrels; in 1767, 609 barrels; in 1796, 6,860 barrels. The amount of beef exported from the United States in 1791 was 62,771 barrels; in 1800, 75,045 barrels; in 1810, 47,699 barrels; in 1815, 13,130 barrels.

The number, quantities, and values of horned cattle and their products, exported from the United States within the last thirty-three years, are shown by the following table:

Years.	Cattle.	Beef.	Hides.	Tallow.	Value.	Butter.	Cheese.	Value.	Tallow candles.
	Number.	Barrels.	Number.	Pounds.	Dollars.	Pounds.	Pounds.	Dollars.	Pounds.
1820–21	5,018	66,887	13,558	81,691	698,323	1,069,024	766,431	190,287	1,453,628
1821–22	3,557	97,610	15,079	63,856	844,534	1,149,783	722,548	221,041	1,564,460
1822–23	2,865	61,418	42,499	735,333	739,461	1,171,701	591,689	192,778	1,682,917
1823–24	2,759	66,074	46,166	96,261	707,299	1,386,232	933,158	204,205	2,186,177
1824–25	3,095	88,025	56,043	533,451	930,465	1,442,197	1,230,104	247,787	2,336,408
1825–26	3,427	72,886	29,841	423,610	733,430	1,176,579	735,399	207,765	2,062,225
1826–27	3,768	90,685	22,883	301,983	772,636	1,148,480	641,385	184,049	2,236,397
1827–28	1,193	66,640	39,642	422,130	719,961	1,184,329	688,548	176,354	2,348,501
1828–29	2,044	51,100	44,282	491,106	674,955	969,137	916,695	176,205	2,522,975
1829–30	4,125	46,842	50,146	533,436	717,683	899,396	688,241	142,370	2,443,045
1830–31	5,881	60,770	299,473	679,623	829,982	1,728,212	1,131,817	264,796	2,669,211
1831–32	8,123	55,507	52,110	622,522	774,087	1,501,686	1,391,853	290,820	2,498,776
1832–32	6,837	64,322	58,179	676,841	958,076	1,346,364	1,213,092	258,452	2,410,385
1833–34	6,441	46,181	60,015	771,239	755,219	1,084,960	819,567	190,099	2,950,301
1834–35	7,348	38,028	41,495	491,412	638,761	684,624	887,000	164,809	2,503,883
1835–36	4,683	50,226	30,379	443,765	699,116	361,395	486,234	114,033	2,275,943
1836–37	3,237	28,076	112,096	168,795	585,146	281,939	411,338	96,176	1,606,424
1837–38	2,826	23,491	56,762	363,036	528,231	495,108	664,660	148,191	1,820,145
1838–39	1,775	16,189	33,852	118,037	371,646	424,609	519,017	127,550	1,310,008
1839–40	4,259	19,681	112,500	273,946	623,373	1,177,639	723,217	210,749	1,710,454
1840–41	7,861	56,537	45,898	980,027	904,918	3,785,993	1,748,471	504,815	2,145,845
1841–42	9,887	48,581	58,187	7,038,092	1,212,638	2,055,133	2,456,607	388,185	1,981,602
1842–43	5,181	37,812	50,340	7,489,582	1,092,949	3,408,247	3,440,144	508,968	1,998,357
1843–44	10,822	106,474	62,658	9,915,366	1,810,551	3,251,952	7,343,145	758,829	3,086,566
1844–45	5,252	101,538	111,636	10,022,504	1,926,809	3,587,489	7,941,187	878,865	3,490,736
1845–46	3,101	149,223	143,323	10,435,696	2,474,208	3,436,660	8,675,390	1,063,087	3,718,714
1846–47	3,383	111,979	181,394	11,172,975	2,434,003	4,214,433	15,637,600	1,741,770	3,094,985
1847–48	1,919	103,719	36,145	8,004,235	1,905,341	2,751,086	12,913,305	1,361,668	3,468,593
1848–49	2,607	103,286	23,390	9,334,138	2,058,958	3,406,242	17,433,682	1,654,157	3,170,109
1849–50	1,848	95,307	71,940	5,858,459	1,605,608	3,876,175	13,020,817	1,215,463	3,587,884
1850–51	1,350	90,648	86,624	8,198,278	1,689,958	3,994,542	10,361,189	1,124,652	3,227,633
1851–52	1,078	122,259	55,421	4,767,020	1,500,429	2,222,264	6,650,420	779,391	3,612,002
1852–53	1,076	126,041	25,955	3,926,598	2,214,554	2,658,911	3,763,932	862,343	2,772,188

According to the census returns of 1840, the number of horned animals in the United States was 14,971,586; of 1850, there were 6,385,094 cows, 1,700,744 oxen, and 9,693, 069 other cattle, one year old and older, (in the aggregate, 17,778,907;) showing an increase of 2,807,321. The present number of cattle may be estimated at 20,000,000, which, at $20 each, would amount to $400,000,000.

CONDENSED CORRESPONDENCE.

Statement of JOSEPH CORNISH, *of East Granby, Hartford county, Connecticut.*

This county has long been noted for its well-matched, fine working oxen, as well as for its cows. The Devon and Durham breeds have been so long in use here, that the common cattle of the country have almost disappeared.

The cost of raising until three years old is about $25 each. The usual price of a good pair of steers is from $60 to $100. One yoke under three years old sold for $125; another yoke for $175. Heifers are worth from $25 to $40 each; new milch cows, from $35 to $75 each.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

It is believed by our farmers that a given quantity of food will produce more meat when fed to half-bloods, or to the first cross between the Devons and Durhams, the Devons and Herefords, or the Devons and our common stock, than when fed to any full-bloods. It has also been found that the first cross or half-blooded animals is very beneficial, often producing progeny superior in most respects to either of the parents.

The cost of raising until three years old is $30 each; and our best Devon steers, well trained, will sometimes sell as high as $125 per yoke; the usual price is $60 to $80. The price of dairy cows in the fall is $20 to $30; in the spring, about $10 to $12 more.

Statement of ANTHONY M. HIGGINS, *of Wilmington, New Castle county, Delaware.*

As near as can be ascertained, about 1,800 head of cattle—average weight when fat about 700 pounds each—have been fed in this district, and sold at from $7 to $8 per hundred. It is estimated that about 2,500 head will be required to supply the wants of our farmers. Grazing is annually increasing, as we subdivide our fields for that purpose.

This year, cattle have been ruled unusually high, generally bringing from 50 to 100 per cent. on the investment, independent of the improved quality of the manure, especially when fed on corn-meal. Our supply is obtained from the west, yet our soil and climate are well adapted to rearing full-sized animals.

I raise my own oxen, which, when broken into yoke at three years old, with ordinary keeping, generally weigh from 1,000 to 1,200 pounds live weight. They are also very extensively used by our farmers. Sometimes they sell as high as $200 for a single pair. They are worked a year or two, and then fattened for show-beef. I recommend the Devon stock for working oxen; they are noted for their docility and quick gait, and are also very fair as to milking qualities.

Statement of J. E. McClung, *of Bloomington, McLean county, Illinois.*

Cattle raising is the great business of Illinois. The Durham is preferred to any other breed. The cost of raising a three-year-old steer is from $12 to $15, and brings from $18 to $25. A good dairy cow in the spring is worth $25, and the same animal in the succeeding fall from $15 to $18.

Statement of William J. Phelps, *of Elmwood, Peoria county, Illinois.*

In feeding cattle we adopt the Ohio and Kentucky system. The corn is cut and shocked in the field, whence it is hauled as needed to the feeding lots, which are changed and alternated from day to day, the cattle being followed by three or four times the number of hogs, which are wintered in the best manner upon the excrement and waste. By remaining on the stalk, the ears are soft and are masticated with ease; the blades and stalks furnish excellent fodder, and the process of fattening is carried on as rapidly, and at much less expense than upon ground food fed in stalls.

Statement of Edwin Winship, *of Winship's Mills, Clinton county, Indiana.*

We have in this county a number of individuals who are engaged in buying cattle in small lots, and taking them to the prairies, where they collect large numbers to sell to drovers from Ohio and Pennsylvania.

These cattle are kept on the prairies in Indiana and Illinois, in the following manner: The owner selects his location for grazing early in the spring, hires a man to herd them, and furnishes him with a pony, and prepares a lot called a "pound" to put them in at night. As soon as the grass starts in the spring, he takes his cattle to the grazing ground, adjacent to some farmer on the edge of the prairie. He starts his cattle out in the prairie early in the morning by themselves. After breakfast he mounts his horse, follows them some two or three miles, and keeps them together where the grass is plenty and sweet, until noon. He then comes in to his dinner, feeds his horse, and then returns to his cattle to see if any have run astray. He remains with them until night, when he brings them in and puts them in the pound for the night.

The cost of keeping a lot of cattle in this manner during the summer, is the herdsman's wages and board, and their salt. One hundred dollars will keep four or five hundred head of cattle during the summer.

The cost of raising neat cattle here till three years old, is $3 50 per

annum, or $10 50 at that age. They are worth, on the spot, from $14 to $16 each. Milch cows, with their calves, are valued at from $12 to $25.

Statement of S. B. WARD, *of Auburn, De Kalb county, Indiana.*

Our county has been settled but for a few years, and there has been but little pains taken as yet in raising stock. Cows are worth from $12 to $20 per head; oxen, from $50 to $80 a yoke; two-year-old steers, from $10 to $15 a head; three-year-olds, from $15 to $25 a head.

Statement of SAMUEL D. MARTIN, *near Pine Grove, Clarke county, Kentucky.*

The cost of raising cattle here depends much upon the treatment they receive. Stock cattle are generally fed in winter upon the stalks and fodder of the corn which have been cut up in the fall and the ear taken off. This food would be wasted upon the farm if there were no stock to eat it. The fodder, with the corn off, can be purchased at from 5 to 10 cents a shock, and one shock will sustain ten head of cattle a day, though they would do better upon more. In summer they are grazed upon the pastures. The probable cost of rearing is about 50 cents a month until they are grain fed. When they are to be fattened, a shock of corn, which contains about five bushels of grain, is given daily to every ten cattle. In this, each steer has about fifteen bushels of grain a month, which costs about $3. The benefit received by the hogs which glean after them is worth the labor of tending. Cattle are usually fed in this county upon the sod of the open pasture during winter.

The value of a bullock at maturity would depend greatly upon his size. Beef is worth here about 6 cents per pound. Most of our beef cattle are sold by weight; and if they are large and fat, 40 pounds per hundred is deducted from the gross weight; small cattle, 45 pounds. I have just sold my three-year-old Durham steers for $60 each. I have a lot of "scrubs," or unimproved cattle, which are worth $25 each, of the same age. A half-blooded Durham steer, at five years old, is worth about $20 more than a scrub at that age. The word "scrub" is used to designate our unimproved cattle, so that the first cross of Durham adds about $20 to the value of a scrub at that age.

The cost of transporting cattle to the Atlantic markets, varies much at the different seasons of the year. It is also influenced by the price of grain. With these variations the following prices may be considered as approaching very near the truth: Driven on foot to Cincinnati, and from thence by railroad to New York, takes 13 days, and costs about $13 each animal. Fed on grain, and driven on foot, 70 days to New York, early in the spring, costs about $13 each. Fed on early grass, and driven on foot, 60 days to Philadelphia, or 70 days to New York, costs from $8 to $9 each. Pastured on late grass, on foot, 60 to 70 days to Philadelphia and New York, costs from $5 to $6 each. The cost to Charleston and Savannah is about the same as to Philadelphia.

The cost to New Orleans by steamboat is about $10 each. The cost of transportation is also influenced by the stage of the river and other circumstances.

Statement of S. H. STARKS, *of Benton, Marshall county, Kentucky.*

The cost of raising cattle here until three years old, is about $7 each. Market value, from $8 to $10; milch cows, from $10 to $20 each.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

There is a great decrease in the common stock of the county, and more than a corresponding increase in number of the short-horns. The superior excellence of this breed for the dairy and the market, points it out as the one that will be the most useful and profitable to be encouraged. They come to maturity a year—some say two years—earlier, grow much larger, thrive better, and take on flesh and fat faster, and with less feed, than the common stock; a number of our best graziers will feed no other kind. Those of the most experience on this subject are certainly best prepared to give an opinion, and, so far as my information extends, they, without an exception, give a decided preference to this breed. A cross from the thorough-bred short-horns on the common stock produces a striking improvement in every respect; and the further the cross is pursued, the more perfect the animal.

The society sold a lot of yearling Durham steers this season at $30 per head, while those of the same age of the common stock could have been purchased at from $10 to $15. Yearlings of the improved breed, if well kept, will weigh 1,000 pounds. Thirty-one of them were sold a few weeks since, in an adjoining county, which averaged per head 947 pounds. At from three to four years old they will weigh, if well kept, from 2,000 to 3,000 pounds live weight.

The society have been attentively and successfully engaged in breeding various kinds of improved stock for the last 35 years, and have bred with a view to improve the milking properties, while, to say the least, they have suffered them to fall off in no other good quality; and their efforts in this respect have not been unavailing, as they now have stock that will compare with any in the world, so far as milk is concerned. No section of country is more favorable to the improvement of stock than our own. The accidents of soil, climate, and other influences that affect or modify animal economy, are all favorable to the health, vigorous growth, early maturity, and longevity of this stock. Nothing, therefore, stands in the way of improvement except the want of proper attention and judicious management.

The cost of rearing calves until three years old is $10 each; of steers, from one to two years old, $15; from two to three years old, $20. The value of a thorough-bred yearling heifer is from $50 to $100; of a Durham cow, from $100 to $400; Durham steers, at one year old, $30 a pair; at three years old, from $80 to $100. Thorough-bred bulls bear very high prices. The comparative scarcity and excellence of these cattle is what keeps up the price to its present rate. Some of the beef

steers are taken to the eastern markets, but a majority of them go to New Orleans. Cost of transportation to the southern market by the river, $10.

Statement of DANIEL FULTON, *of Bowdoinham, Lincoln county, Maine.*

We have but few full-bloods of any improved breed of cattle; but we have a mixture of the Durham, Hereford, and Devonshire breeds with our common stock. The average cost of raising a bullock, three years old, is about $20; the present price is about $25 each. We find the improved breeds best for labor and beef, but the common kinds best for milk. Average price of a cow in the fall, $18; in the spring, $30. Average amount of butter per cow in a year is 125 pounds.

Statement of SAMUEL JOHNSON, *of Jackson, Waldo county, Maine.*

The raising of neat cattle pays no better than that of horses. Steers, in their third or fourth years, may be made to earn something by labor; otherwise they would not pay the cost of raising. The average price of a yoke of oxen, four years old, is about $80. I prefer a cross of the Hereford and Durham.

Statement of GEORGE W. DRISKO, *of Jonesborough, Washington county, Maine.*

A cross of the Durham or short-horn breed on our common cattle is considered the best for labor, being tough, strong, and a general favorite with lumbermen. It is difficult to tell which breed is best for milk. I know several who boast of their cows of different breeds; still it is the honest conviction of practical observers that our old breed, in all respects, is not surpassed in the quantity of milk and butter which they afford. I have a cow of this sort from which 150 pounds of butter were made during the last seven months, besides furnishing milk for all necessary use for a family of three persons, and with only common pasture feed.

Statement of DAVID BRUMBAUGH, *of Marsh Run Mill, Washington county, Maryland.*

Cattle can be raised with profit in this county, owing to the advanced price within the last few years. Formerly, the farmers depended upon the western cattle for their supply, but now they are turning their attention to raising for themselves. The cost of raising a steer three years old is about $15, which is worth $25.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachusetts.*

As to the breeds of cattle most valuable in this section, we have many animals among our common stock that would be an honor to the herds of England, though the number of such are becoming more rare

every year by crossing with foreign breeds. For all points we consider the Devon as the animal best adapted for the short pastures of New England. We think so for the following reasons: They attain a fair size, and are perfectly docile; for oxen, they are strong, quick, walking off like horses; are hardy, easily kept, and readily take on flesh. It is a rare thing to see a Devonshire ox or cow low in flesh in a pasture where sheep would live. The cows may not be so great milkers as the short-horns, but their milk is decidedly richer. There is also always a market for animals of this breed at fair remunerative prices.

The Ayrshires have been introduced to some extent, and certainly possess qualities that should commend them to the notice of northern herdsmen, who have short summers and long winters. The cows are good for milk, but their quality as oxen or for beef is to us unknown.

Statement of SIMON T. ASHETON *and* ELIJAH MYRICK, *Trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

Our breed of cattle is a cross of the Durham with the best common stock, which we like as well as any full-bloods we have ever seen. They are mixed all the way, from one-fourth to seven-eighths. From one-half to three-fourths we consider a good cross, and will make an excellent stock for beauty of color and form, as well as for milk or flesh. All things considered, we prefer the Durham to any other breed. In general, they are quiet, easy to fatten, large in size, and strong in the yoke, though not so fast, perhaps, on the road as the Devon. They are also docile, tractable, and kind to each other. Of late we have introduced some of the Ayrshire blood into our stock, by which we add to the large quantity of the milk of the Durham the richer quality of the Ayrshire.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The short-horned or Durham breed takes the lead with us, though some prefer the Devons for work on account of their color. Crosses between the Durhams and our common stock make the best milkers.

Statement of WILLIAM S. MAYNARD, *of Ann Arbor, Washtenaw county, Michigan.*

Durham cattle, with us, are the best for fattening, and perhaps for work; and the Devons, or a cross of them or the short-horns with our common stock, make the best milkers.

The cost of making butter is 10 cents a pound, which is worth from 12½ to 20 cents per pound. Cheese costs 5 cents, and is worth from 7 to 10 cents per pound. Beef has been shipped to New York this season to good advantage. It is worth here $4 a hundred, paying a profit of 25 per cent.

Statement of J. D. YERKES, *of Northville, Wayne county, Michigan.*

The raising of neat cattle here is profitable when the requisite facilities for keeping them exist on the farm. It should be well supplied with water and good natural grass land, in order to make it a money-making business. Our common cattle, crossed with the Durhams and Devons, produce the kinds mostly kept here. For dairy purposes, some of our common cows are about equal to any improved stock in this country, and I believe that by a careful and judicious course of breeding from such specimens of our common varieties, a class of cattle might be obtained which, for good milking qualities, would stand unrivalled. For working oxen, a cross of the Durhams and our common cows is preferred. They are of large size, and well adapted to heavy work. They possess mild and peaceable tempers, and when unfit for the yoke are easily converted into beef.

Statement of THOMAS W. SAMPSON, *of Ashland Farm, Rocheport, Boone county, Missouri.*

The California trade has produced quite a revolution in the cattle trade in Missouri. They have advanced at least 200 per cent. in price, and decreased in numbers in about the same proportion. The consequence is, that the rearing of cattle is about the most profitable business our farmers can enter into. Of the common stock of the county, calves are worth at present from $5 to $8; yearlings, from $10 to $12; two-year-olds, from $15 to $18; three-year-olds, from $20 to $25; and four-year-olds, from $30 to $45 each.

Cattle are generally grazed on blue grass pasture through the spring and summer months, by such farmers as have it in sufficient quantities; others drive to the prairies in April, and have them herded on the prairie grass until about the middle or last of October. The prairie grass is very fine, and fattens equal to blue grass. The cost of herding is about 50 cents per head. Cattle are usually wintered on what we call "stock fodder," which is the corn cut up whilst it is yet green, and shocked up sixteen hills square, or two hundred and sixty-five hills of corn, and on an average about six hundred and forty stalks of fodder to the hill. The corn is shucked and the husks left on the fodder stalk. One shock a day will keep about eight head of young cattle through the winter, and is worth on an average about eight cents a shock. Counting from the first of November to the first of April, one hundred and fifty days, we have a cost of $1 50 a head for the first year, 50 cents a head for herding in summer, and 20 cents a head for incidental expenses—salt, driving out, &c. We have a cost of $2 20 for the first year; $2 50 for the second year; and $3 for the last or third year.

Our stock of cattle has been very much improved within a few years past, by the introduction of pure-blooded short-horns from England, New York, Ohio, and Kentucky; much the largest number of which have been brought from the latter State. The cattle all over the county are getting more or less mixed, and sell proportionally higher in accordance with the amount of Durham blood. We have some very fine

imported Durham bulls; no other improved breeds of cattle have been introduced in this section. Milch cows of the common stock and one-fourth Durhams are worth from $20 to $40, while those that are from one-half to three-fourths blooded are from $40 to $100. Full-blooded Durhams are worth from $100 to $500, according to quality, size, and appearance, pedigree, &c. I am breeding my cows, about twenty in number, this season, to three different bulls, all pure-blooded Durhams brought out from Kentucky.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

From my own experience, and from the observations of others, I am led to believe that the blooded stock of cattle is not so good for milk nor for draught steers as the common breed known here as the "Patton stock." The Durhams make the best beef, but their quality as milkers is rarely above mediocrity, while the complaint exists among many of our farmers that the bodies and feet of the steers lack that proportion for the draught that is required to give strength, durability, and capacity for extraordinary fatigue. The effect of a cross between this and the common stock is generally to improve the size of the latter, while it diminishes the milking qualities of the cross and the efficiency of the steers.

The raising of beef cattle has become an object of greatly increased gain within the last few years. Missouri being an eminently pastoral region, has capacity for raising immense herds; and though, until lately, the production of cattle was an object of very little importance to our farmers, on account of the low prices of their kind of stock, yet now a great, and, it is believed, permanent stimulus has been applied to this branch of husbandry by the markets of California on the one side, and the Atlantic States on the other, to which large numbers of our native cattle are driven annually after being wintered in Ohio and Indiana. In former years I have known cows sold as low as $5; now, it must be a very indifferent milker, and a very small animal, that will not sell for $25. This increase of price has caused more attention to be paid to the raising of beef cattle than any other kind. The best stocks are being imported yearly into various portions of this State; and in a few years, with our boundless prairies, and a fertile soil that bears luxuriantly the most succulent grasses, Missouri bids fair to stand among the first in the cultivation of this product of husbandry.

The cost of raising horned cattle is about $5 a year, and their value at maturity for beef is about 5 cents per pound; ordinary and half-blood cows vary in price from $20 to $50; steers are worth from $50 to $100 per yoke.

Statement of D. C. GARTH, *of Huntsville, Randolph county, Missouri.*

Cattle raising here is found to be very profitable. The cost of rearing a bullock until three years old will not exceed $5, and his value at that age is from $20 to $25. The price of a cow and calf ranges from $20 to $30.

Statement of ARMSTRONG O'HARA, *of Saint François county, Missouri.*

Cattle here are generally of the common breed, and can be raised at a cost of $9 at three years old. They sell at from $15 to $20 a head.

Statement of LEVI BARTLETT, *of Warner, Merrimack county, New Hampshire.*

Cattle and sheep are raised more largely here than other kinds of domestic animals. The great majority of the cattle is what is usually termed "native stock," comprising a great variety as to form, color, size, and difference in cash value at a given age. As an illustration of this, one farmer will sell a pair of two-year-old steers for $35, while, perhaps, upon the next farm, a yoke of the same age will readily sell for $60. These differences often arise from our hap-hazard manner of breeding and lack of care in rearing and feeding from the birth of the calf until it arrives at maturity.

At our State and county fairs, there are always to be seen numerous yokes of oxen, of the "native breed," that will compare favorably with any of the imported kinds. So with many of our best milch cows; but as they have no fixed blood in their veins, their progeny cannot be depended upon in sustaining the good qualities of the mother. Hence it is a standing proverb, "that a good cow may bring a bad calf." A very few Durhams are to be found among us, the general belief being that they would require too high feeding to be profitably raised by the farmers in this northern clime. The North Devons find more favor. They are of medium size, well proportioned, and their beautiful deep-red color is a sure passport to the favor of most farmers. How they may prove here as milkers has not yet been ascertained, as it is but four years since the first Devon bull, from the herd of Mr. Hurlbert, of Connecticut, was introduced here. There are now numerous half-blood Devons among our farmers, of one, two, and three years of age, and so far they are highly prized.

The Ayrshires have been somewhat disseminated through this county. But they have, from some cause or other, failed to sustain their foreign reputation as good milkers; as they also have in Massachusetts, where some of the most choice bloods were imported a few years since by the Massachusetts Society for promoting Agriculture. The progeny of these were given in pairs to the county societies, but they failed to give satisfaction to the farmers of the old "Bay State." Reasoning from analogy, we should infer, from the similarity of the Scottish soil and climate to our own, that the change would not materially affect them. But from the disappointment experienced here in regard to their milking qualities, "it would seem that American *air* cannot compensate them for the Ayr they have left."

Our beef-cattle and sheep are conveyed to Brighton market (80 miles) by railroad—oxen at about $1 per head, when a full car load is forwarded; dressed hogs, butter, cheese, and other farm products, at 25 cents for 100 pounds. In transporting live cattle and sheep from this to Brighton market per railroad, there is a great saving in shrinkage over the old method of "footing" it, and consequently a saving to

all parties concerned—the farmer, the drover, the butcher, and consumer.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Among the old races of cattle which have long existed with us, some noble specimens still remain. But it is generally conceded that our best and finest breeds have been derived from animals imported from England within the last twenty years. The point, however, has not yet been settled, which is the best breed of cattle, the Devons or the Durhams. Among the most intelligent stock-growers, each breed has its firm defenders. The Devons here are derived directly from South Devon, in England. Those that pass here as Durhams are derived principally from some pure-blooded animals that were imported by Mr. Thomas Weddle about eighteen years ago. The Devon cow is a beautiful animal, but not a great milker. They are red or white, or a mixture of both, and of no other color.

Among the estimable points of this breed are the fine, thin, clear bones of the legs and head, the mellow touch of the skin, the creamy color of the muzzle and around the eyes, and the fine tapering, light-colored horns. The Durhams, on the contrary, are noted as great milkers and excellent cattle for beef.

To raise a steer or heifer to an age of three years, would cost, the

First year	$7 10
Second year	11 20
Third year	16 30
Total	34 60

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

The cost of raising neat cattle in this county until three years old will not vary far from $17 to $22. Some of our wealthy farmers have taken much pains to improve their breeds, which has proved sufficiently successful to remunerate them well for the expense.

Statement of JOHN B. YOUNG *and* JAMES DE MOTT, *of Ovid, Seneca county, New York.*

Of neat cattle we have the Devons and Durhams, or short-horns, and common breed, with mixtures of all, which have received much attention the past two years.

The cost of rearing to three years old is estimated to range from $20 to $25 each. The price of good three-year-olds, in good flesh, now ranges from $30 to $40 per head. Most of our cattle designed for market are fitted for slaughter here and taken to New York by railroad, the company charging by the car load $63, and will carry on an average fifteen head; thus making the average freight about $4 each, incidental expenses about $3, or total cost about $7 per head. Sheep and hogs are generally taken in the same way when fitted for slaughter; a car will carry about 150 of each by being put upon two floors, one above the other.

Statement of JOHN HURLBUT, *of Arkport, Steuben county, New York.*

The high price of beef and mutton has given an impetus to the raising of domestic animals, and considerable attention is being paid to the breed and quality. I would remark that there is a great difference in ordinary cattle, and we probably have as good milkers among our common cows as any that can be found among the various kinds of imported stock; and I have even known some common cattle equal to any other breed I ever saw for fattening. But it must be conceded that they are exceptions to the general rule. The best of farmers with us are introducing the Durhams, or short-horns, quite extensively. They fatten readily, and are superior to all other cattle in size and symetry.

In regard to the cost of raising neat cattle, and the expense of transporting them to market, I would remark that it depends altogether upon the manner in which they are kept. Ordinarily, the expense of raising steers until four years old is about $25 each, keeping them, of course, in the winter on corn-stalks and straw, with hay in April; and such ordinary cattle are worth, at the age of three years, about $35 each. On the other hand, if they are stabled in the winter, and kept constantly improving, they will, at four years old, readily command $60 each or more, while the cost will be increased about $15. I am fully satisfied that cattle consume one-third less fodder when comfortably stabled, than when allowed to roam unprotected over the fields. The cost of taking cattle to New York by railroad, is from $4 to $5 per head.

Statement of LEWIS G. MORRIS, *of Mount Fordham, Westchester county, New York.*

The kinds of cattle I am propagating are the Herd-Book short-horns and Devons. This breed requires a rich soil and good care. If this is complied with, they are more profitable than any other breed, as they unite milking and beef qualities to a greater extent than any other, and will mature at three years, while another breed would take five years to attain maturity. They are a Herd-Book animal, having been recorded in Coates's Herd Book since the year 1822.

The Devons in color are invariably red, with the tip of the tail white, and have long horns. They are peculiarly adapted for working oxen, as their temper, spirit, and sprightliness of action, if properly broken, will perform any farm work as quick as horses. As a dairy stock, I do not think they rank very high; but there are always exceptions to a general rule, and I have seen very good dairy stock among them. For beefing qualities, they lack early maturity; but the quality of the beef is far superior to the short-horn, and they may be kept in almost any climate, and will stand a poor farm and carelessness of treatment as well as any breed I know. If obliged to roam over a large tract of land to collect their pasture, their agility enables them to do so without worrying off their flesh. They are a pure and distinct breed, but were not a Herd-Book animal before 1851.

Statement of SANTARRILLA S. G. FRANKLIN, *of Cuba, Clinton county, Ohio.*

There is not much attention paid here to the improvement of cattle, except a few crosses of the Durham with our common stock. A few days since, one man sold a lot of twenty-five steers for $1,000. The average price of neat cattle at three years old, is about $15 each.

Statement of LUTHER BAILEY, *of the United Society of Shakers, North Union, Cuyahoga county, Ohio.*

The short-horns, or Durhams, with us, for large, fine animals and excellent fattening qualities, cannot be outdone; and for milk, with proper care in selecting, they may be as serviceable as any.

The price of thorough-bred Durham calves at six months old, varies from $50 to $100 each.

Statement of JACOB KNOOP, *of Elizabeth, Miami county, Ohio.*

We have some very fine Durham cattle in this county, and from them a very valuable cross is obtained for beef; but for dairy purposes, the common stock is preferred. Milch cows are worth from $20 to $35 each, and steers two or three years old, from $40 to $60 a pair. When fattened, they bring about $5 a hundred.

Statement of P. W. GILLETT, *of Astoria, Clatsop county, Oregon.*

Cattle in this Territory, especially in the interior and southern parts, amount to almost nothing. They keep fat during the whole year upon grass. The average price of beef in this county, is from 18 to 20 cents per pound. Good cows are worth from $80 to $100 a head; oxen, $150 to $225 a yoke.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

Cattle are raised here with little more care than to keep them from straying. Besides our own consumption of beef, large droves of fat cattle are taken to the mines. Milch cows are worth $75 per head. Through the milking season, the yield per cow is from 75 to 100 pounds of butter. Beef is worth 11 cents per pound. Oxen are worth $125 per yoke.

Statement of ISAAC R. EVANS, *of Harrisville, Butler county, Pennsylvania.*

There are but few cattle of improved breeds in this section, although the subject is becoming a great object to our farmers. They find a ready sale for any of their stock at any season. The cost of rearing until three years old is about $15 a head. The present value at that age is from $15 to $20 each.

The breaking of steers is one of the most important operations of cattle raising. My method is, to take a pair of animals two or three years

old, which are in good condition, and tie them up in the barn by the horns with a strong rope, where they cannot injure themselves. I then handle them occasionally by leading them around, until they know what it is to be confined. As soon as they will lead pretty well, yoke them, and tie their tails together, to prevent them from turning their yokes; putting them in a clear yard, where they cannot go very far without turning. I drive them around a few times, in order to accustom them to travel together, a few days after which they will do to go to ordinary work in a team.

Statement of H. N. McAllister, George Buchanan, James Alexander, J. K. Shoemaker, *and* William J. Waring, *being that portion of their report which relates to cattle, to the Centre County Agricultural Society, Pennsylvania.*

Oxen are not used for labor in this county, except in the lumber districts, although many farmers might employ them advantageously.

Durham and Devonshire cattle are being introduced, and crossed upon our common breeds, with manifest advantage to farmers.

Statement of N. Linton, *of Cochransville, Chester county, Pennsylvania.*

Horned cattle have not been raised extensively in this section, until recently. Farmers have long been in the habit of feeding them for market, taking them from droves brought principally from Ohio, Virginia, and Illinois. Cattle are selling out of droves this fall at from $4 to $6 per hundred, according to quality; and fat cattle at prices varying from $6 50 to $9 per hundred; the feeders thus realizing from $15 to $35 advance on each steer. Many farmers also stall-feed cattle in the winter, with the view of disposing of their grain on the farm, and thereby greatly increasing their manure, and preventing their land from becoming exhausted by selling their corn and oats by the bushel. In this way they often get market prices for their grain, and sometimes more. But the farmer's success in feeding cattle depends on his judgment in buying. If he be able to distinguish all the good points of a steer, estimate correctly the amount of his growth, and judge accurately of his disposition to lay on fat, he will hardly fail in being successful. If he fail in these particulars, his success will most likely be accidental. Farmers in this county have also mostly bought their working oxen from Western droves. The prices this season have ranged from $100 to $200 a yoke. After these oxen have worked one or more years, they are fed for market, and sell for the highest prices. But the scarcity and high prices of stock cattle of late years have induced farmers to turn their attention more to raising calves; and young stock may be seen on almost every farm. The cost of raising young cattle until three years old, will average about $25; and they will sell for as much or more than Western stock of like quality. Fat cattle are usually sold to drovers; they buy them from the farmers, either as they stand or by weight, allowing from 54 to 56 pounds of beef to each hundred of gross weight.

Statement of JOSHUA S. KELLER, *of Orwigsburgh, Schuylkill county, Pennsylvania.*

There are few, if any, full-blooded cattle in this county; but we have some fine mixed cows, both of Devon and Durham, as well as excellent animals of the common breed. Quite a number of calves have been raised within the last few years. A bullock or heifer can be raised (two years old) for about $20 or $25. Formerly the butchers bought all the calves, especially the largest and fattest, which is fast going out of practice; for the farmer now sees his advantage in keeping the best, and killing or selling the inferior ones. Our best cows will bring from $40 to $50 each.

Statement of JOHN EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

The best and the only thorough-bred cattle we have, are the Durhams. I have a calf, that for beauty and symmetry of form cannot be excelled. Quite an improvement has also been effected by crossing our best common stock with the Durhams. It is a fact generally admitted, that more beef can be made with a given amount of food in a specific time, and of sufficient abundance, from a full-blooded Durham, or short-horn, than from any other breed. Our milking stock, containing a "strain" of the Durham blood, are also of superior quality, and are highly prized.

Statement of JOSEPH PARKER, *of West Rupert, Bennington county, Vermont.*

The expense of keeping neat cattle the first two winters, is about one and a half tons of hay to each, valued at $7 per ton; the third winter, two tons, amounting, say to $31 50. To this add thirty weeks' pasturing, the first year at 5 cents per week; the second, 10 cents; and the third year, 12½ cents per week; amounting to $8 10—making the cost at three years old, $39 60. The value of a good animal at this age is about $30. The Devon breed, here, is highly valued for labor.

Statement of H. W. LESTER, *of Rutland, Rutland county, Vermont.*

The horned cattle of Vermont are mostly of a red color, well made, of fair size, and perhaps better milkers than any foreign breed. The Devons, Herefords, and Durhams have been frequently introduced and crossed with our common stock, with decided benefit. We like the cross with the Devons best, as such cattle are superior for work, beauty, and activity.

Red, close-built, short-haired animals are often underrated in weight, while other colors are overrated. Late in September, 1852, I dried off and began to fatten two middle-sized cows—one deep red, close-haired, and fifteen years old; the other, half Durham, red and white, ten years old. They both were fed alike, and killed about the middle of December. Before they were slaughtered, they were examined by several persons considered good judges. The Durham was called good, and believed to weigh from 500 to 650 pounds. The red cow, called

ordinary, was thought to weigh from 500 to 525 pounds. When killed and dressed, the red cow weighed 651 pounds, had 4 pounds more rough tallow, and the beef looked best; while the red and white, when dressed, weighed 630 pounds.

Raising and fattening three-year-old cattle, or cows, costs about $4 per hundred pounds; average weight, 600 pounds. Rearing oxen costs about $5 50 per hundred pounds; average weight, 950 pounds. Cost of conveyance to Boston market by railroad, $3 per head. Driving them on foot costs less, but wastes more.

Statement of WILLIAM SMOOT, *of Boone Court House, Virginia.*

Our cattle, like our horses, are not of the improved or imported kind; though I might remark, that we have a slight mixture of Durham, and other English blood, infused in our stock.

Cattle, at three years old, cost $9 to raise them, and are worth from $16 to $18 at that age.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

We have but few improved cattle. We give them the range until harvest; from then until Christmas they are pastured; then fed on shucks, straw, and top-fodder until spring, when they are again let into the range. Beef is worth from 2½ to 4 cents per pound at home—from 5 to 6¼ cents in market. Cows and calves are worth from $10 to $18 each; working oxen from $20 to $50, according to quality. The cost of raising I have never yet calculated.

Statement of HENRY M. PRICE, *of Nicholas Court House, Virginia.*

Cattle command the chief attention of our farmers. They are chiefly raised by "browsing," having little attention given them besides regularly salting during the summer. In winter, if kept over, they are fed with hay upon the meadows and open grass lands, which serves to enrich them without other manuring. The farmer here but seldom sells his hay, which is decidedly a wise policy. The fall before the cattle are four years old, they are usually sold and driven off to other counties to be grain-fed. The usual price is from $17 to $20.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

Much attention is given in this region to the raising of neat cattle and the products of the dairy. The butter produced in Fond du Lac county is of excellent quality, and the pasturage, particularly on the prairies and openings, could support several times the stock of cattle that graze upon it. Fat beef is produced on the wild pastures, which would not unfavorably compare with the stall-fed beeves of the Eastern markets. In view of the facilities afforded by railroads, some feeders have begun to fatten for the New York market. Common cows produce, on an average, about 150 pounds of butter a year. Value through the season

13 or 14 cents per pound. The cost of raising neat cattle till three years old, is about $15 each.

Introduction of the Asiatic Buffalo, the Brahmin Ox, and the Cashmere, Scinde and Malta Goats into South Carolina, by JAMES B. DAVIS, *of Columbia.*

The want of calcareousness in nearly all of the soils of the Southern States, together with the heat of our sun, makes an inaptitude to perrennial grasses for grazing animals; hence more suitable for browsing, as both tend to originate shrubbery and weeds. In 1836, having had some experience in the importation of short-horned, Devon and Ayrshire cattle into this State, I then summarily advanced an opinion, "that all cattle brought from a Northern to our Southern climate must necessarily degenerate to the peculiarities of our location, and that it would be easier to improve cattle already acclimated, *or import animals from a still warmer region.*" In my late sojourn in Asia and the East, I had reference to this observation in importing Cashmere, Scinde and Malta milking-goats, as well as the Brahmin ox, or Nagore, of India, the Asiatic buffalo, or water ox, and other animals.

The Cashmere, Persian, Angora and Circassian goats are one and the same animal, changed in some respects by altitude, though but little by latitude. They abound in all this inaccessible territory, and are the eating, milking, cheese and butter-making and clothes-making animal of the whole country. They are finely developed for the table, much disposed to fatten, very white and beautiful, with long fine wool or curly hair, yielding about 4 to 4½ pounds to the fleece. They can be easily procured by an energetic man acquainted with the peculiarities of the population, and at a cost of $4 to $6 each on the spot. I brought to the United States, in 1849, seven females and two males. They have kids only every spring, usually two at a birth. The full breeds have increased only to about thirty, from the accidental circumstance that in nearly every instance the issue has been males.

In locating these animals in different sections of South Carolina, I can see no difference between those reared here and the imported, with the exception that those reared in this State are finer and heavier fleeced than those imported.

On my arrival, I immediately procured a number of our little diminutive native female goats, and crossed them upon a Cashmere buck. Their progeny had hair very fine, but little longer than that of the does. I again crossed the females of this progeny upon the other Cashmere buck, and it was difficult to distinguish these from the *pure breed*, and the subsequent cross cannot be detected. In the spring, I contemplate effecting still another cross.

I consider this a most valuable and useful experiment, as I made an arrangement with amateurs to sell pure bucks at $100, and to exchange annually, so as to furnish them with the advantages of different crosses. In ten days all the pure breeds were taken, with a demand for many more. Even the mixed kids have been readily taken by those determined to infuse their blood with their stock. In these arrangements, however, I have located them from the top of the mountains to the sea-

board, both in Carolina and Georgia. Apart from their manifest practical aptitude in all these particulars, there is this ultimate value to be considered: a Cashmere shawl is worth from $700 to $1,500. Why is this difference, except in their intrinsic value from durability as wearing apparel? I have socks which I have worn for six years, and are yet perfectly sound.

No naturalist has yet been able to assign a systematic law regulating the acclimatization of animals. The Merino sheep, whenever it has been removed, has generally changed, and in most cases for the worse. Even when first crossed upon the best Saxony sheep, it was a deterioration, but when crossed upon a coarse-wooled animal it improved the fleece; and the cross fixed both the character of the wool and the carcass. This fact is observed in many other instances, demonstrating that the constitution of animals must be connected with location to fix the characters of the wool or the carcass. In fact, the same temperature, but modified by altitude instead of latitude, does not produce the same results. On all of the table mountain and valley plains between Persia and Turkey in Asia, all the animals have fine, long, silken hair, as the Angora cat, greyhound, and rabbits, and I have seen the same in some specimens of the Koordistan horse. To a considerable extent this is the fact on the western part of South America.

In connexion with this part of the subject, I will now introduce the Thibet shawl goat, belonging to the coldest regions. I accidentally came in possession of a pair of these animals, but lost the male. I have a considerable increase from the female, bred with a Cashmere buck. The Thibet goat has, under a long, coarse hair, a coat of beautiful white wool, which, when combed, makes about a pound to a fleece. I had these specimens with me at the Zoological Gardens in London, and in comparing them with a stuffed specimen of a Rocky Mountain goat, I could not discover the slightest difference; nor do I yet see any change of the fresh cross of the Cashmere buck upon my Thibet doe; but in the third cross upon the Cashmere, we may expect a valuable experiment by changing the fine under-wool, or down, into a conjoint and uniform covering of wool.

In regard to the Scinde goat, so called from the province at the mouth of the Indus, he is a gigantic animal, with pendulant ears twenty-two inches long, is used for the table and dairy, and is very similar to the Syrian goat. The Malta milking-goat is also only for the dairy, giving about a gallon of milk in a day. It may not be uninteresting for me to state a fact observed by me in the malarious sections of the United States and Mexico. In all the similar sections of Asia and the East, they regard cow's milk as being an exciting cause to bilious fevers, as well as to liver complaints, and hence use only goat's milk. The *modus agendi* I see has been a matter under discussion by the faculty of Paris.

Having given thus much on the subject of goats, I now hasten to the cattle. In referring to the Nagore or Brahmin cattle of India, in Youat's work on British cattle, it will be perceived that they are organized to undergo the fatigues of the hottest climates known, and will carry a soldier six miles an hour for fifteen consecutive hours. I brought but one pair to the United States, and, as far as I can learn,

my crosses of them upon other cattle are the first known in this country. I crossed this bull upon Ayrshire, Devon and Durham breeds, as well as upon our common cattle. The offspring is considered, by all who have seen them, far the handsomest animal of the cow kind. They are symmetrical and active, and can keep fat when any other cow would starve. I had this half-breed crossed again upon our cattle, but am not yet sufficiently experienced to report of their milking qualities. As evidence, however, that our agriculturists confide in the appearances, my half-breeds readily sell for $1,000 a pair, and the second cross, or half Brahmin, at from $100 to $300 each. Preferring the mixed breeds to the pure, I sold to Mr. Edes, of Kentucky, the original pair for $4,000, as that State would prove a better place to breed and disseminate the stock. As Kentucky is the dependence of the South for beeves, they needed an animal that could come to us in the hot months of summer and remain healthy and sound. They have from this animal a progeny that will travel thirty miles a day in August, and the further south they go the better suited—the great desideratum to the Northern breeder and the Southern consumer.

The Asiatic buffalo, or water ox, is a large, ugly, hardy animal. The cows are good milkers, making fat and good-flavored beef, though coarse-grained, and precisely suited to seacoast marshes, where no other animal can venture, as well as to lands subject to inundation.

I am unprepared to say anything practically of my other importations, but will continue to report my experiments, and believe many of them will become matters of history.

DAIRIES.

CONDENSED CORRESPONDENCE.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

The average quantity of cheese per cow in this region is about 300 pounds; of butter, about 200 or 250 pounds. Much care is requisite in the amount of salt given to cows, as it has lately been found that large quantities eaten at any one time will prevent the milk from coagulating. This is a fact known to but few, and was discovered by trying good rennet upon milk which had failed to coagulate on the first trial. A second trial had the same effect, and the cheese did not come. If milk fails to coagulate, the dairy woman suspects at once that the fault is in the rennet, whereas it may be in the milk.

Butter has sold this year in New York from 17 to 25 cents per pound, and my cheese brought, in Philadelphia, from 10 to 12½ cents per pound.

Statement of ANTHONY M. HIGGINS, *of Wilmington, New Castle county, Delaware.*

A large quantity of butter is annually made in this county and sent to the neighboring cities, especially Baltimore, where it has for a long time maintained the highest reputation as to quality, bringing from 25 to 37½ cents per pound. Our dairies comprise from fifteen to seventy-five cows each. The Holstein, Durham, and Devon infusion makes an excellent grade with our common stock, as respects size and milking properties. The first named is preferred by Major Reybold, who kept a large dairy for many years, as they have larger frames, a greater depth of udder, and yield more milk; they require, however, good keeping. A son of this gentleman informs me that he has two dairies of fifty cows each, and that he annually manufactures about 15,000 pounds of butter. The stipulated price the year round is 25 cents per pound. He calculates that the net revenue from his two dairies amounts to $3,600 per annum.

Some proprietors of dairies rent their cows to a dairyman, at the rate of from $22 50 to $25 each cow per annum—the former furnishing the provender. There is not enough young stock here to keep up a supply. Western heifers are annually brought in at a cost of about $22 a head.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

The dairy business, though much favored by soil and climate, has not been put forward with a view to export its products. Every farmer liberally supplies his own family with milk and butter, and has enough to spare to supply the home demand. The business, however, is receiving increased attention, and may, with proper care and management, be made a source of great profit when we have better facilities for getting to market. The Durham cows, which have been gradually increasing in number since the year 1817, are, by those most familiar or conversant with them, acknowledged to be better adapted to the dairy than those of any other breed ever introduced into this section.

The dairy cows of this society, about one hundred and fifty in number, being all Durhams—some thorough-bred, others with a slight strain of the Patton breed—are unsurpassed in the quantity and richness of their milk. They will give for the first three or four months after calving, while on grass alone, from 30 to 68 pounds of milk daily; and from experiments made in the early part of October, 18 pounds of milk will make a pound of butter. Some of these cows do not go dry during the year; others are dry a longer or shorter time, but rarely exceeding eight weeks.

We never soil our milch cows, but believe it much better to have them run at large in the pastures day and night, except in the winter season, when they are kept in the stable, tied each in her own proper stall, from five o'clock in the evening until eight in the morning. They are driven up, however, and stabled morning and evening during the balance of the year while they are milked, and then turned out to

range. From early in the spring until late in the fall they subsist on blue-grass and clover pastures, and are only fed during the remainder of the year, morning and evening, with sheaf-oats, cut fine, made wet, and mixed with meal or "ship-stuffs;" also, occasionally with slops from the kitchen, pumpkins, small potatoes cooked for the purpose, and hay at will during the night. In this way they are kept fat or in fine order from year to year.

Good dairy cows, mixed from one-half to seven-eighths Durham, are worth from $40 to $50 each; common stock, from $15 to $25. Butter is worth from 12½ to 15 cents per pound; cheese 10 cents. The price of milk, from its abundance, scarcely nominal. The Kendall churn is reputed the best of any proved by the society.

Statement of WILLIAM H. COOKE, *of Howard, Warren county, New Jersey.*

The average yield of butter per cow with us is 120 pounds, taking a number of cows together, though some of our dairymen make 160 pounds from a small number of cows extra well kept.

The average price for butter this year has been 25 cents per pound in the New York market. The value of good dairy cows is from $30 to $35 in the fall. The usual price of a two-year-old heifer is $20. Steers are about the same price.

Statement of P. W. GILLETT, *of Astoria, Clatsop county, Oregon.*

Clatsop plains are the only parts of this county which produce any considerable quantity of butter and cheese; and I must say, that where the business is properly attended to, I never saw better articles anywhere than are made here. The average price of butter here is 62½ cents per pound; cheese 50 cents.

Statement of ISAAC R. EVENS, *of Harrisville, Butler county, Pennsylvania.*

Dairy husbandry is beginning to attract the attention of a number of farmers in this section. The average product of butter is about 125 pounds to the cow; of cheese, from 250 to 275 pounds. Market value of butter, 16 cents per pound; of cheese, 8 cents per pound. The value of dairy cows in the spring is from $18 to $20; in the fall, $5 less.

Statement of JOSEPH BOWDITCH, *of Fairfield, Franklin county, Vermont.*

We have some of the improved breeds of cattle, so called, such as the Durham, Devonshire, and Teeswater. The Durham ranks first for the butcher. The Devons are beautiful in color, symmetrical in form, and are quite good milkers; yet our farmers seem to be satisfied with our common stock for the dairy. The cows average 150 pounds of butter, or 400 pounds of cheese, the season. Butter is worth 18 cents per pound, and cheese 8 cents. It costs $10 a head per annum to keep cows well.

Cows should be fed with meal or roots in the spring, commencing a short time before they calve, and continue until there is a full supply of

grass in the pastures. There is no animal that pays better and more promptly for being well fed than the cow. She does not ask you to "trust," but "pays down." Cows fed with hay only, will decrease in milk in four or five days after calving, and will not give so much after being turned into the summer pasture as though properly fed previously. We allow the first to calve in March; and for the dairy it is desirable to have them all come in by the first of May. We feed them with hay six or seven months. Young cattle, sheep, and colts are fed from five to six months in a year. It is deemed the better way to shelter all our animals during the winter in warm stables, and feed exclusively in the barn, only throwing into the yard the refuse that is taken from the stables. Our winters being long and cold, at least one-third is saved by feeding within doors. The hovels should be cleaned twice every day, and littered with straw or leaves from the forest, giving the cattle sufficient time to drink and exercise, and in calm, pleasant days let them spend one-half of the day in the yard.

Our farmers keep from 5 to 225 cows each. Some raise young cattle and colts, keeping sufficient cows for the use of the family; others keep cows exclusively. At least three-fourths of our income is the product of the dairy. Some kill their entire lot of calves, strip off their skins, and add the carcasses to the manure heap; others select the most perfect ones, (red is preferred for color,) and kill the rest. By selecting our best calves we are improving our breed. I have a neighbor who has taken 200 pounds of butter to the cow this year, from those of his selecting when calves. They had no extra feed. Some dairies make butter exclusively; others cheese about 100 days, and butter the rest of the season. Many employ horse-power for churning, using the old-fashioned dasher churn, which is placed in the basement of the dairy-room, where the cream and butter in warm weather are kept, and the horse outside of the building, where a band running in through the window puts the dasher in motion. The dairy-rooms, and everything used about them, are kept perfectly sweet.

It costs $15 a head to raise cattle to the age of three years. They are worth this year $25 each. Some extra matched steers are worth $80 per yoke.

HORSES, ASSES, AND MULES.

The first horses imported into America were brought to St. Domingo by Columbus in his second voyage, in 1493. The first introduction into any part of the territory at present lying within the United States, were landed at Florida by Cabeça de Vaca, in 1527, being forty-two in number, all of which soon after perished or were otherwise destroyed. The next importation, which consisted of a larger number, was also brought to Florida by Ferdinand de Soto, in 1539.

Horses were brought to Acadia by M. L'Escarbot, in 1604. In

1608, the French extended their settlement into Canada, and soon after introduced horses and various other animals.

In 1609, three ships from England landed at Jamestown, in Virginia, with many immigrants and numerous domestic animals, among which were a horse and six mares.

The first importation of horses into New Netherland was made from Holland by the "Dutch West India Company," in 1625. The whole number of animals shipped on this occasion was one hundred and three, consisting of stallions, mares, bulls, and cows, besides hogs, sheep, rabbits, and goats. The value of a horse there in 1637, was $32. In 1643 there were only twenty draught horses in the colony, and in 1646, the price of a good horse or mare was $64; of a stallion $132. In about the year 1670, horses were imported from the bishopric of Utrecht, which far excelled those brought from England.

Some twenty or thirty years before the Revolution, the steeds most prized in New York, for the saddle, were pacers. To this end the breed was propagated, and trained there with great care. "Naraganset pacers," at that period, were in such repute, that they were procured from Rhode Island at much trouble and expense.

The first importation to the colony of Massachusetts Bay was in 1629, and consisted of from forty-five to fifty-five horses and mares, many of which either died on the passage or soon after their arrival; so that only one horse and seven mares survived. Most of the animals brought to this colony, including horses, cattle, goats, coneys, and turkeys, were ordered by Francis Higginson, formerly of Leicestershire, whence some of the animals were brought.

In the vicinity of Piscataqua river, in 1635, there were thirteen mares and nine colts.

Horses existed in considerable numbers in different parts of Louisiana as early as the year 1678, and about thirty were in possession of the Indians on Red river in 1690. They were also common among the French of Illinois as early as 1750.

In 1670, horses were raised in Connecticut in sufficient numbers to be sent to the other colonies.

General Wade Hampton and Colonel William Singleton, of South Carolina, were both engaged in the importation of blood horses before the Revolution; so that prior to the year 1783, horses were so common in the vicinity of Charleston, that almost every planter raised annually one or more colts for racing—which were also considered the best in the country for the saddle or for draught, except those of Virginia.

Upon Washington's first retirement, in 1783, he became convinced of the defective nature of the working animals employed in the agriculture of the Southern States, and set about remedying the evil by the introduction of mules instead of horses, the mule being found to live longer, be less liable to diseases, and require less food, and in every respect to be more valuable and economical than the horse in agricultural labor at the South. Up to this period, scarcely any mules were to be found in the Union. A few had been imported from the West Indies, but they were of diminutive size and of little value. As soon as Washington's views on this subject were known abroad, he

received a present, from the King of Spain, of a jack and two jennies, selected from the royal stud at Madrid. The jack, called the "Royal Gift," was sixteen hands high, of a gray color, heavily made, and of a sluggish disposition. At the same time, the Marquis de Lafayette sent out a jack and jennies from the island of Malta. This jack, called the "Knight of Malta," was a superb animal, of a black color, with the form of a stag and the ferocity of a tiger. Washington availed himself of the best qualities of the two jacks by crossing the breeds, and hence obtained a favorite jack, called "Compound," which animal united the size and strength of the "Gift" with the high courage and activity of the "Knight." The jacks arrived at Mount Vernon in about the year 1788. The General bred some very superior mules from his coach mares, sending them from Philadelphia for the purpose. In a few years, the estate of Mount Vernon became stocked with mules of a superior order, rising to the height of sixteen hands, and of great power and usefulness—one wagon team of four mules selling, at the sale of the General's effects, for $800.

There were exported from Savannah, in Georgia, in 1755, forty-eight horses; in 1770, three hundred and forty-five horses and thirty mules. The number of horses exported from Portsmouth, New Hampshire, in 1790, was two hundred and seven.

The number and valuation of horses and mules exported from the United States within the last thirty-three years, are indicated in the following table:

Years.	Horses.	Mules.	Value.	Years.	Horses.	Mules.	Value.
	Number.	Number.	Dollars.		Number.	Number.	Dollars.
1820–21	853	94	$59,830	1837–38	4,418	409	$331,620
1821–22	1,182	121	93,753	1838–39	3,168	882	291,625
1822–23	1,630	438	123,373	1839–40	2,759	872	246,320
1823–24	2,711	840	213,396	1840–41	2,930	1,418	293,143
1824–25	3,861	576	283,835	1841–42	2,964	1,503	299,654
1825–26	2,931	922	47,543	1842–43	2,002	1,193	212,696
1826–27	1,666	1,067	173,629	1843–44	3,135	2,019	315,696
1827–28	1,442	1,377	185,542	1844–45	3,052	3,248	385,488
1828–29	1,985	1,299	207,858	1845–46	3,082	3,020	382,382
1829–30	2,138	695	182,244	1846–47	2,077	2,341	277,359
1830–31	2,184	1,540	218,015	1847–48	996	1,625	190,295
1831–32	1,798	1,128	164,034	1848–49	896	568	96,982
1832–33	2,040	1,011	167,330	1849–50	957	871	139,494
1833–34	2,954	1,000	233,554	1850–51	1,364	2,946	198,155
1834–35	3,616	1,100	285,028	1851–52	1,550	1,233	247,550
1835–36	4,553	875	346,689	1852–53	1,390	1,337	246,731
1836–37	5,022	764	368,094				

According to the census returns of 1840, there were in the United States 4,335,669 horses and mules; of 1850, there were 4,336,719 horses, and 559,331 asses and mules, (in the aggregate 4,896,050.) The present number, including those of cities, may be safely estimated at 5,000,000, which, at $60 each, would be worth $300,000,000.

CONDENSED CORRESPONDENCE.

Statement of JAMES WILLIAMS, *of Bolivar, Jackson county, Alabama.*

Mules of the first quality can be raised here at a cost of $25 each at three years old. They are worth at that age from $60 to $100. What is said of mules will apply to horses, except that they are attended with a little cost and trouble in rearing.

Statement of ANTHONY M. HIGGINS, *of Wilmington, New Castle county, Delaware.*

A few years back, it was thought unprofitable to raise horses, as a larger sized animal, at less cost, could be furnished from the West. Recently, however, they have ruled so high, that farmers begin to find it necessary to raise their own stock. A good three-year-old colt, unbroken, will readily bring from $80 to $150. We have no foreign stock of recent importation. A member of the Reybold family recently returned from the Springfield Horse Show with the best specimen of the celebrated Morgan breed he could procure, without regard to price. The introduction of this horse, which is a colt, sixteen months old, of the Black Hawk breed, together with two fillies, also of the Morgan stock, may be regarded as a valuable acquisition to our State.

Statement of Hon. E. CRAWFORD, *near Blakely, Early county, Georgia.*

Horses and mules, as well as cows, hogs, and sheep, are raised by every judicious planter and farmer in all Southwestern Georgia; and, on account of the mild climate and the abundance of the crop commonly called "crab-grass," in sufficient numbers to supply the wants of the establishment at a cheap rate.

Good horses and mules are raised by all who attempt to do so, but a large majority prefer buying animals of this sort, driven to the State in immense numbers from Tennessee, Kentucky, Ohio, and other grass-growing countries.

Statement of J. E. MCCLUNG, *of Bloomington, McLean county, Illinois.*

The raising of horses and mules with us is profitable. The cost of rearing a horse or mule till three years old, is about $30.

Statement of EDWIN WINSHIP, *of Winship's Mills, Clinton county, Ia.*

The raising of horses in this county is a profitable business. The kinds raised are well built, either for draught or for the carriage. They are generally put into the harness at two years old, when they are easily broken. They should be carefully handled and put to light work; in a short time they will become gentle, and may occasionally be worked until three years old. From this age, they will be able to

pay for their keeping until four years old, when they will be ready for market.

The expense of raising a horse until three years old, (he costs $10 a year until then) is $30.

Statement of DANIEL JARRETT, *of Muncietown, Delaware county, Ia.*

Horses are raised to some extent among us, and I think they have been paying better than most other kinds of stock. Good animals have been commanding from $80 to $100 each.

As I have noticed the views of a number of persons on the handling and breaking of colts, I will give mine. I first catch and restrain it before many days old, and handle it gently, which is occasionally afterwards repeated. It can as well be taught to be held and handled at three days old as at three years. As soon as it becomes a little accustomed to the bridle, it may be used for treading out grain with a steady horse until it is pretty well tired. When it has come to the proper time of drawing, gear it to a wagon with another horse, and let the draught at first be light, and increase the draught as you find it willing to draw.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Horses in this State, or rather in the central part, were first bred, for some thirty years, to an imported English race-horse, until there might be found animals which, for speed and endurance, could not be surpassed anywhere. The farmers, as well as the turfmen, bred to these horses; but they found they had erred, as they did not suit for the practical uses of the farm. They had too much metal, and were also too small. To remedy this evil, they imported an English draught-horse of the Flanders breed. In this they found they were on the other extreme; their progeny were too heavy for our McAdamized roads, and too slow for the plough. Another cross being necessary, they more recently imported from Canada the Norman French horse, and others from Vermont of the same breed, which have been crossed on our English race-mare, and produced a most valuable stock. These animals appear to suit for all purposes, for the saddle as well as harness. With this cross, it is presumed Kentucky may be looked to as having the most valuable horse, for all practical purposes, that can be produced.

Cost of raising colts to three years old, from $40 to $45. Value at maturity, from $70 to $150, and in some intstances more. Cost of transporting them by water to Mississippi and the New Orleans market, $10; by land to the other Southern States, something less.

Many mules are raised in this vicinity of very superior qualities; but they have not been much used in farming, owing to a general objection growing out of their "peculiar qualifications," though they are more hardy and durable than horses. Some farmers prefer them where steady work is to be done, such as hauling, &c.; and they are now coming into more general use. At the present time, they are the most

profitable stock raised in our vicinity. Mares, however, are not so apt to breed to jacks as to horses. Farmers who rear the colts, generally sell them at weaning time, or when about six months old, to the feeders and graziers. The cost of raising a mule-colt till two and a half years old, when ready for market, is $50. Value of the colt at six months old, $60; at two and a half years old, from $90 to $120. Cost of transporting them by water to the coast or the New Orleans market, from $8 to $10; by land to the Southern States, something less.

Statement of DANIEL FULTON, *Bowdoinham, Lincoln county, Maine.*

Considerable attention is paid here to raising horses, which are considered as profitable at present prices as any stock. The Messenger and Morgan breeds are considered the best in this State.

Statement of WILLIAM UPTON, JR., *of Dixmont, Penobscot county, Maine.*

The rearing of good horses has always been regarded by us, and no doubt truly so, as a profitable business. The various grades of the Messenger breed are here considered most valuable for the carriage. "Bush Messenger," owned by Hiram Reed, of Augusta, fifteen years old, light gray, took the third premium at the late National Horse Fair at Springfield, Massachusetts. Many of his colts are scattered through this State, and generally bear the distinguishing traits of their sire. They are docile, good travellers, and seldom shy.

The large Pennsylvania horses have been tried here for the purposes of heavy teaming, but have been found deficient in strength of muscle, powers of endurance, and their feet usually give out apparently from the mere weight of their bodies. They are excelled by a low, heavy-limbed French horse, brought from Canada, and deservedly popular for heavy work, as they possess great powers of endurance and thrive under hard work and coarse fare. Farmers generally here, as elsewhere, are far from taking that pains to breed from the best animals which its importance demands.

As the rearing of good blooded horses costs no more than those of indifferent kinds, not unfrequently hundreds of dollars reward a proper discrimination in this particular. The risk of rearing is such, from the various accidents to which they are peculiarly liable, that the apparent profit is considerably reduced. The cost of rearing till four years old, under favorable circumstances, may be stated at $60. They are worth at that age $100, though speed or fancy carries them far above that price, while, on the other hand, some unlucky accident may render them entirely worthless.

Statement of SAMUEL JOHNSON, *of Jackson, Waldo county, Maine.*

Colts at four months old are worth from $25 to $30 each. The cost of keeping the first two years is as high as $15 per annum; the third and fourth years, about $20 per annum. The yearly loss I will put at one out of seventeen, or about 6 per cent. To this I add the interest,

which makes a colt that cost $25, stand, when four years and four months old, at $121 63; and the one that cost $30, at $129 59; the average cost being $125 61. The moderate amount of labor they should perform up to that age will barely pay the expense of breaking. The average price of horses at that age, is not over $125; consequently, they merely pay the expense of raising. One reason why the raising of horses is not more profitable, is a want of carefulness in breeding.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

Our horses consist of a mixture of the French, Morgan, Black Hawk, and Duroc breeds, crossed on each other and our own common stock. The cost of raising a colt I estimate at $5 the first year, $10 the second year, and $25 the third year. The prices vary from $60 to $100 each. Cost of transportation to New York via railroad and steamboat, about $20 a head.

Statement of THOMAS W. SAMPSON, *of Ashland Farm, Rocheport, Boone county, Missouri.*

Horses have been raised heretofore without much regard to the particular purpose for which they were intended. If one turned out to be a good saddle or draught animal, it was more the result of accident than design, and the consequence has been that our county is filled with an assorted lot, with but few good specimens for any particular purpose; but the farmers have learned better within the last five years. Much attention has been paid to the rearing of three distinct breeds—one for the saddle, another for the harness, and a third for the draught. At the late exhibition of the Boone County Agricultural and Mechanical Society at Columbia, eleven brood mares were exhibited for the first prize, none of which were under sixteen hands high, and the majority of them from sixteen and a half to seventeen hands high. They were worth from $150 to $250 each. We have in our vicinity several stallions for draught purposes over seventeen hands high.

All the largest and best mares are bred to jacks for the purpose of raising mules, as they are considered more profitable, for various reasons—early maturity, less liability to accidents or disease, more easily and cheaply kept, and always in market at any age at remunerating prices. Mule-colts have sold the present autumn at the usual weaning time, about the 1st of September, from $45 to $70; and fancy or extra colts, from $100 to $150 each. The mule-colt which took the first prize at the late exhibition of the State Agricultural Society at Boonville, could have been sold for $150. The mule which took the first prize as the best two-year-old, was full sixteen hands high, very heavily made, and of a beautiful form. There was $250 offered for it, but refused. The animal which took the first prize for the best aged mule was seventeen hands high, and a very beautiful animal. The cost for keeping a mule from weaning time until the fall after it is two years old, when they are usually sold, is about from $25 to $30. Last year and the year before, mule-colts sold from $25 to $35 each. This

fall two-year-old mules, in lots to drovers, have sold from $85 to $110, according to quality. Aged well-trained mules for wagon or farm use, fifteen hands high, are worth from $125 to $150 each.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

The cost of raising a horse is about the same as that of a mule—that is, from $18 to $20 per annum. The raising of the former, however, is not conducted on the same systematic plan as that of raising mules, but at maturity (from five to eight years of age) horses are generally purchased by buyers who select such as they can find to suit them, and then, when their number is completed, drive them in a body to the South. Less attention is paid now than formerly to the blood of this kind of stock. The thorough-bred (though in my opinion a popular error exists here) is not generally regarded as so well adapted to the draught as horses of larger and heavier frames. The additional cost of procuring a foal from a blooded horse, has had a tendency to encourage the introduction of cheaper and larger breeders for a market where lately no distinction has been made on account of pedigree.

The prices of horses vary now from $70 to $150. The average may be quoted at $100.

The raisers and buyers of mules have found the rearing and sale of these animals a very lucrative business. As a general thing, the mule raiser, unless he desires to gather a large drove, will sell his colt at weaning time, which is from the 1st to the 20th of September. The present price for foals of this age, is from $40 to $75. It sometimes happens that a colt of extraordinary size will sell for a sum exceeding this last limit, yet the prices named are those generally given. The colts are usually bought by some farmer whose occupation it is to purchase foals, and raise and break them for labor.

The preparation for mule feeding consists of large enclosures of blue-grass pastures, with a very high and strong fence, provided with a shelter from the inclemency of the weather, and food of corn, hay, or fodder, whenever the ground is covered with snow, or the intensity of the cold prevents grazing. These animals are thus kept until they are generally four years old, when they are either sold to purchasers who visit our State from Kentucky or the Southern States, or are driven by their owners to a Southern market. So few of them go to the Atlantic States by railway or canal, that I have found no one who can give me any information as to the cost of this mode of transportation.

The cost of rearing a mule is from $18 to $20 per annum, and its value at maturity varies from $80 to $120.

Statement of H. L. BROWN, *of Fayette, Howard county, Missouri.*

The rearing of horses and mules is highly profitable with us. The cost of raising a horse or mule colt till three years old, might safely be put at $10 a year, which, at that age, together with the service of the horse or jack, would put the mule or horse at $40 or $50. At that age good animals will average $100. Some mule-colts have sold this fall, at weaning time, at $100 and upwards each.

Statement of D. C. GARTH, *of Huntsville, Randolph county, Missouri.*

The cost of rearing mules here until they are three years old is about $25, and their value at that age is, on an average, about $85. The average price of mule-colts has been gradually increasing for the last four or five years. At present they are worth about $50 each.

Statement of ARMSTRONG O'HARA, *of Saint François county, Missouri.*

There are few, if any, blooded or foreign horses with us. Those we have are generally from the great Mississippi valley. The cost of raising is $45 at four years old. Fair draught-horses will command from $75 to $100. Cost of transportation by steamboat to the Southern markets $10, the owner to furnish the feed.

Mules cost about the same for raising as horses, except that they are fit for market at three years old, and meet with a more ready sale.

Statement of THOMAS SHOURDS, *of Lower Alloway's Creek, Salem county, New Jersey.*

Our present breeds of horses are crosses of the Messenger, Windflower, and perhaps some others, upon our old stock. The Norman breed is also beginning to be introduced into this vicinity.

The cost of rearing a colt till three years old is about $50, and if the stock is good and properly cared for, a good animal will command $100.

Horses and mules are raised in this county to a considerable extent, but not in sufficient numbers for our own use, particularly the latter. They are hardy animals, easily reared and kept, and might be supported the first three years for about $40 each, or $80 a pair, which, if I am correct, would be much more profitable than horses.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

The horses raised here are almost as various in breed as they are in color. We have crosses of the heavy English draught-horse and the light English courser; the heavy-necked French horse and the wild Indian pony. For heavy labor, the crosses of the English draught-horse are preferred, while for the road, lighter horses are found to be the best.

The expense of raising a colt until it is three years old, according to the present prices of hay and pasturing, is as follows:

First year, fifty-two weeks, at 30 cents per week....	$16 60
Second year, fifty-two weeks, at 40 cents per week....	20 80
Third year, fifty-two weeks, at 50 cents per week....	26 00
Total expense.....	63 40

Statement of JOSHUA HARRIS, *of Welche's Mills, Cabarras county, North Carolina.*

Little attention is paid here to the raising of stock of any kind. Horses and mules are brought in by drovers from Kentucky and Tennessee, and command high prices. Good horses sell for from $100 to $125; mules from $100 to $150 each.

Statement of SANTARRILLI S. G. FRANKLIN, *of Cuba, Clinton county, Ohio.*

Horses are not generally raised here for market, except a few fine ones, good draught animals for the farm being the main object. For rearing a colt until three years old, it costs from $10 to $12 a year. Their average value at that age is $50.

Statement of JACOB KNOOP, *of Elizabeth, Miami county, Ohio.*

The present high prices obtained for horses has also induced many of our farmers to engage in raising good horses and mules. A good four-year-old horse brings from $120 to $150, and mules, at two or three years old, are worth about $100 each. The expenses of driving them to the Atlantic markets are about $10 a head. The cost of raising horses till ready for market about $60; mules about $50.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

Horses succeed well here. Those Yankee bred are worth from $150 to $200 each. The Indian horses and Spanish mules are used in doing the drudgery of the country, and in packing to the mines.

Statement of H. N. MCALLISTER, GEORGE BUCHANAN, JAMES ALEXANDER, J. K. SHOEMAKER, *and* WILLIAM J. WARING, *being that portion of their report which relates to horses, to the Centre county Agricultural Society, Pennsylvania.*

The horses used and most needed are heavy draught, and this class of horses is brought to great perfection here. The quick draught and saddle horse has been from time to time improved by the introduction of stock from neighboring States. In 1834, the late Henry F. Tammany, of this county, purchased at the sale by government, at Washington, "Abder Haman," one of the stallions presented by the Emperor of Morocco to General Jackson, then President of the United States. This horse was kept here about three years, and though too small and light for this region, when combined with the larger breeds his progeny have proved valuable for the saddle and quick draught.

Horses now bring here from $100 to $150 each.

Mules are much used about our iron works. They are preferred, because of their being less liable to disease, hardier, and longer lived than horses. Many of the carters, however, have an aversion to them, and it is difficult to find one who does not prefer driving a team of horses. They are not raised here, but are brought from Kentucky, and cost from $100 to $130 each.

Statement of M. F. Myers, *of Kingston, Luzerne county, Pennsylvania.*

Our horses are tolerably well bred animals, being crossed and re-crossed by the different blooded stallions which have made their appearance among us from time to time for the last twenty years. When well matched, they will command from $350 to $600 a pair. There were a number of pairs sold last spring in my neighborhood for that price. The cost of rearing a good colt I do not think will exceed $50 or $60 until three years old. He will then command $100, and will pay his way, if judiciously managed, until he is fit for market.

Statement of Joshua S. Keller, *of Orwigsburgh, Schuylkill county, Pennsylvania.*

Horses can be raised with us to some advantage. I saw colts of two years old sold for $100; and in one instance, a stallion colt, two and a half years old, sold for $230. They are of the greatest value for the different branches of industry in our district, although a large number of mules are employed in the mining operations, in teams, and some on farms. A horse that is well shaped, works well, and is faultless, is very seldom sold for less than $100, and from that to $230.

The cost of rearing a colt may be estimated from $35 to $45 a year, till he becomes two or two and a half years old; after that, he will cost from $50 to $80, or more, according as he is kept; at that age some labor can be obtained from him. Many of our farmers labor under great disadvantages for the want of servants who know how to treat a horse; hence we see so many ruined before they are half raised.

Statement of H. D. Maize, *of New Berlin, Union county, Pennsylvania.*

The animals which can be raised to the best advantage in this section of the country, I think, are horses. The cost of raising a colt until he is four years old will vary with different persons and the circumstances under which he is raised, ranging probably from $60 to $75, and his value at that age here will be from $125 to $150. I speak of a serviceable, good horse. The cost of transporting him to Philadelphia, on foot, may be about $5. As there are no imported blood-horses in this vicinity, except the breed most common in this State, I can only say they have been the only ones used for labor.

Statement of John Eichar, *of Greensburgh, Westmoreland county, Pennsylvania.*

We have but very few thorough-bred horses in this county. The only stock of importance is that from the "John Marshall," which was sired by the celebrated blood-horse "Gohanna," out of "Lady Alfred."

The cost of rearing colts of the first class for heavy draught, at three years old, is about $42, which will bring at that age, upon an average, $100.

Mules are not raised to much extent in this county, although quite a number are used on the canals and at the furnaces, where they are considered superior to horses for bad roads and rough usage. They

are mostly brought from Kentucky, where they are more profitably raised than horses. One gentleman in that State sold, last spring, one hundred head of three-year-old mules for $15,000, one third more than could be obtained for horse-colts of the same age. They are a hardy race of animals, and can be reared with less care and expense than horses.

Statement of JOSEPH PARKER, *of West Rupert, Bennington county, Vermont.*

The expense of keeping a colt the first winter is from 1½ to 2 tons of hay, valued at $7 per ton; the second winter 2 tons; the third winter 2½ tons, amounting say to $42. To this add the pasturing, thirty weeks each season—the first year at 10 cents per week; the second 15 cents; and the third 20 cents per week, amounting to $13 50; making the cost of rearing, at three years old, $55 50. The average value of a horse here at three years old, is about $75. The Morgan horse is regarded by us as the most suitable for labor.

Statement of JOSEPH BOWDITCH, *of Fairfield, Franklin county, Vermont.*

Most of our farmers keep a pair of horses; one, and sometimes both of which are breeding mares. They often do the entire work of the farm, while others share the work with oxen. It costs $40 to raise a colt to the age of three years, worth from $50 to $150 each. We are improving our breed of horses more than any other stock that we raise. Our best ones are of the Morgan and Black Hawk breeds.

Statement of H. W. LESTER, *of Rutland, Rutland county, Vermont.*

The breeds of horses the most esteemed here are the Morgans and Black Hawks, which are generally sold at home from $100 to $150 each. The cost of raising varies from $30 to $100 per annum. This variation in the cost may seem at first a little wide; at the lower price, however, a colt may be kept on hay and grass with but little attention, except foddering in winter; the higher price is often fully expended when the colt is kept up through the year. The care of him requires half a man's time; he is fed with the warm new milk of a good cow during the year, with a number of baked sweet-cakes daily, besides hay and oats, and is well groomed. Horses reared in this way are from 13 to 15½ hands high; weigh from 900 to 1,200 pounds; are docile, very active, great travellers, and for speed and bottom are not to be beat.

Statement of WILLIAM SMOOT, *of Boone Court House, Virginia.*

Our horses are generally of the "scrub" variety, with a very little imported blood in them. They are generally raised more for farm use than otherwise. We feed them only in winter, which costs about $10 a head; the rest of the year they graze on our pastures, requiring nothing more than a little salt.

The cost of raising a colt until three years old does not exceed $40. They sometimes sell at that age for $75.

SHEEP.

The first sheep introduced into any part of the present territory of the United States were brought from England to Jamestown, in Virginia, by the "London Company," in 1609. In 1648, the number of sheep in that colony had increased to three thousand. In 1657, sheep, as well as mares, were forbidden to be exported. In the early part of the last century, they throve well and bore good fleeces; but wool raising was suffered to decline, owing to the losses sustained by tearing off the wool by bushes and briers.

The first sheep imported into New Netherland were brought from Holland, by the "Dutch West India Company," in 1625; others were brought from Zealand and Texel to Rensselaer's Wick in 1630. But little progress was made in sheep raising on the Hudson for many years, in consequence of the ravages committed by dogs and wolves. In 1643, there were not over sixteen sheep in the colony; in 1650, they were so scarce that an animal bearing a ewe was worth from $8 to $10.

Sheep were introduced into the plantations on Massachusetts Bay prior to 1633, as mention is made of keeping them on the islands in the harbor to protect them from the Indians and wolves. By the inventory of Piscataqua and Norridgewock, in 1635, that settlement contained ninety-two sheep. In 1652, the increase had been so great in the vicinity of Boston, that Charlestown numbered four hundred alone. Sheep were introduced into Nantucket in 1660, at the time of its first settlement by the proprietors. A prosperous business has ever since been carried on there in wool raising. The average number of sheep sustained on the island is about seven thousand. Before the Revolution, considerable quantities of wool were exported to France. In 1790, the number of sheep exported from Piscataqua was two hundred and sixty-one.

Although the honor of first introducing Merino sheep into the United States from Spain has generally been accredited to Hon. David Humphreys, late minister to the Court of Madrid, it will appear from the following extract of a letter from William Foster, dated at Boston, November 23, 1853, that they were brought to this country nine years before

"In April, 1793, on returning from Cadiz, where I had been passing several years, I brought out an original painting by Murillo, and three Merino sheep—two ewes and a ram; the export of which at that time was severely prohibited, and attended with much difficulty and risk. We had a long passage, (seventy-five days,) and the sheep were in a dying condition. Fortunately, there was on board a Frenchman, that had been with the Spanish shepherds, who cured them by administering injections.

"Being about to leave this country for France, soon after my arrival in Boston, I presented these sheep to Mr. Andrew Craigie, of Cambridge, who, not knowing their value at that time, 'simply ate them,' as he told me years after, when I met him at an auction buying a Merino ram for $1,000."

The following table shows the number, quantity, and valuation of sheep and wool exported from the United States within the last thirty-three years:

Years.	Sheep.	Value.	Wool.	Value.	Total.	Years.	Sheep.	Value.	Wool.	Value.	Total.
	Number.	Dollars.	Pounds.	Dollars.	Dollars.		Number.	Dollars.	Pounds.	Dollars.	Dollars.
1820–21	11,117	22,175	.....	.....	22,175	1837–38	6,698	20,462	.....	.....	20,462
1821–22	6,368	12,276	.....	.....	12,276	1838–39	6,084	15,960	.....	.....	15,960
1822–23	6,880	15,029	.....	.....	15,029	1839–40	14,558	30,698	.....	.....	30,698
1823–24	7,421	14,938	.....	.....	14,938	1840–41	14,639	35,767	.....	.....	35,767
1824–25	9,681	20,027	.....	.....	20,027	1841–42	19,557	38,892	.....	.....	38,892
1825–26	8,695	17,693	.....	.....	17,693	1842–43	13,609	29,061	.....	.....	29,061
1826–27	8,745	13,586	.....	.....	13,586	1843–44	12,980	27,824	.....	.....	27,824
1827–28	5,545	7,499	.....	.....	7,499	1844–45	6,464	23,948	.....	.....	23,948
1828–29	6,846	10,644	.....	.....	10,644	1845–46	9,254	30,303	668,386	203,996	233,999
1829–30	15,460	22,110	.....	.....	22,110	1846–47	10,533	29,100	378,440	89,460	118,560
1830–31	8,262	14,499	.....	.....	14,499	1847–48	6,231	20,823	.....	.....	20,823
1831–32	12,260	22,385	.....	.....	22,385	1848–49	4,195	16,305	.....	.....	16,305
1832–33	11,821	21,464	.....	.....	21,464	1849–50	3,945	15,753	35,898	22,778	38,531
1833–34	16,654	29,002	.....	.....	29,002	1850–51	4,357	18,875	.....	.....	18,875
1834–35	19,145	36,566	.....	.....	36,566	1851–52	2,968	16,291	55,550	14,308	30,599
1835–36	6,342	18,548	.....	.....	18,548	1852–53	3,669	17,808	216,472	26,567	44,375
1836–37	3,460	16,852	.....	.....	16,852						

According to the census of 1840, there were in the United States 19,311,374 sheep; of 1850, 21,723,220, one year old or older. The present number of sheep in the Union, exclusive of lambs, may be estimated at 23,000,000, which, at $2 each, would amount to $46,000,000.

CONDENSED CORRESPONDENCE.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

I bought my farm in 1835, and stocked it with sheep, and with fair prospects of success. My first clip of wool sold for 65 cents per pound, and the fleeces averaged over three pounds each. This, together with the price of the lambs, which was $1 75, afforded a fair remuneration. My sheep cost me $3 per head, and I spared no pains in improving my flock, by selling off the poorest and buying better, until I had added about 25 per cent. to their value. At that time, between this place and Poughkeepsie, a distance of forty miles, there were many more thousands of sheep than at present.

About this period Congress began to reduce the tariff, and then the price of wool began to recede from year to year, until I sold my last clip, from a part of the same flock, at 29 cents per pound—wool of better quality than the first clip, which sold for 65 cents. As wool could not be sold for money, except at a ruinous sacrifice, I disposed of my flock for 75 cents to $1 per head—some of the same sheep that cost me $3 each—a ruinous sacrifice, both on my flock and on wool. I have since turned my attention in part to rearing improved sheep, for breeding purposes. I have selected the Cotswold, which I think the best, both for supplying the market with mutton and coarser grades of cloth. My success has thus far

exceeded my expectations. The demand for this kind of sheep has been such, that they sell for very remunerating prices in various parts of the county. From present appearances, the demand is likely to increase on the supply, the finer grades of sheep having gone out of this part of the country. The markets depend mainly upon the coarser grades of sheep for a supply. I have this year exhibited at the Litchfield Agricultural Society a Cotswold sheep and her three lambs, (all at one birth,) the weight of which, at six months old, was 312 pounds, or 104 pounds each. They were brought up by the same dam, without extra feed. Last year the same sheep produced two lambs, which, at the same age, weighed 126 pounds each. The usual weight of my lambs at that age is from 80 to 120 pounds.

Since raising coarse sheep, I have never failed of producing more lambs than I have sheep—say thirty-five lambs to thirty sheep. My wool this year sold for 34 cents per pound. The weight of fleece varies according to keeping, from four to ten pounds a fleece. It is sufficient in a large flock to keep them well enough to make their fleeces weigh over seven pounds each.

Statement of ANTHONY M. HIGGINS, *of Wilmington, New Castle county, Delaware.*

Not less than 15,000 head of sheep have been purchased by our farmers this season from the West, at prices ranging from $2 50 to $6 a head. The wethers are designed for feeding during the winter; the ewes for their lambs the summer after. Fat sheep, through the winter, rule from $4 50 to $8 each. Ewes are deemed by many the most profitable, as the lambs readily bring from $3 to $3 25 each. Wool is worth $1 50 per fleece. The manure and advance on a ewe's own carcass will contribute considerably towards defraying the expense of her keeping. It is estimated that one acre of clover will keep five ewes and their lambs.

Mr. Reybold, of Delaware City, says in a note to me: "We have imported regularly every two years two rams and six or more ewes of the Cotswold or New Oxfordshire stock, and I now have some eighty very superior full-blooded ewes. We find universally that a cross with our common Western sheep, which are generally half or quarter-blooded Merinos, will add 100 per cent. both to wool and carcass. The wool generally commands about the same price as half-blooded Merino wool.

"I have found the average yield from the progeny of my imported sheep to be, for bucks and wethers from 15 to 18 pounds, and for ewes 10 to 12 pounds, to the fleece of well-washed wool.

"My full-blooded bucks, at one year old, command from $50 to $100 each, according to quality; the ewes from $25 to $40 each. I have found no difficulty in disposing of my sheep, as fast as they become ready for the market, at the above-named prices. The cost of rearing I believe to be about the same as that of our common breed. The value of the stock at maturity, for mutton, must greatly depend upon the condition of the animals when put into market. I had a small lot

of wethers in February last weighing, when dressed, as follows: 269½, 213, 203, 201, 181, and 160½ pounds each. I have another lot now on hand, which, by February next, will make quite as good, if not a better average than the above."

Statement of EDWIN WINSHIP, *of Winship's Mills, Clinton county, Indiana.*

The breeding of sheep is receiving increased attention with us every year. Many of our farmers think it more profitable than raising corn. Quite a number of them keep flocks sufficiently large to produce wool for family use. The wool is generally sold to the agents of the manufacturing establishments in the Eastern States.

Wool-growing would be more profitable if sheep could be protected from the ravages of dogs; but these animals are so plenty, and so mischievous, that it is difficult to obtain indemnity for their ravages, and some have almost abandoned the business from this cause.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

In this vicinity sheep are not raised in very great numbers, though they do well and are considered profitable, every farmer having his flock. This society has tried most of the improved breeds, and is now making trial of the French Merinos, which promise to do well, on account of their thick and heavy fleeces, &c. A cross from the Merino or Saxony on the Cotswold or Bakewell, produces a sheep with fine long wool, excellent for worsted. Average weight of fleece of Saxons, from 2½ to 3 pounds; of Spanish Merinos, from 3½ to 4 pounds. Other large and coarse-wooled sheep yield heavier fleeces.

Price of wool, from 35 to 40 cents per pound; but little difference made in price between coarse and fine. The number of lambs raised per annum is nearly equal to the number of ewes. Cost of keeping per head per annum, from 50 to 75 cents each.

Statement of WILLIAM UPTON, JR., *of Dixmont, Penobscot county, Maine.*

The rearing of these animals, for many years neglected or but little attended to, is now beginning to attract considerable attention from farmers of this vicinity, as both wool and mutton have considerably advanced in price, and have become quite an article of transport to Brighton market. They are also largely consumed in our nearer market at Bangor. Lambs six or seven months old are worth each $2, though for several years back $1 25 was about the average price for them. Cost of freight to Brighton market, 25 cents each.

An essential service has been rendered to this section by Mr. Charles Perly, of Woodstock, New Brunswick, who, several years since, imported from England into that province some large coarse-wooled sheep, said to be the pure Dishley. They are well adapted to this

region, though there is an objection to the full bloods of this importation, as their wool grows from eight to ten inches long, and parting on the back, which peculiarly exposes the animal to the vicissitudes of our cold New England storms. Some of the rams of this breed have sheared at one clip 17 pounds of clean wool. The various grades of this breed of sheep have been driven by hundreds for several years past from Aroostook county, adjoining New Brunswick, into other parts of the State, and, when crossed with our common stock, are considered very valuable for their hardiness, large quantity and superior quality of mutton, and for the heavy yield of wool they produce.

The price of wool here usually varies from 25 to 40 cents per pound; but this year it is worth from 40 to 46 cents per pound.

Statement of SAMUEL JOHNSON, *of Jackson, Waldo county, Maine.*

Sheep, in order to make them most profitable, should be wintered chiefly on corn or beans. I give each of my sheep about a gill of corn per day, or three-fifths of a bushel during the winter. This, with a trifling amount of hay or straw, will keep them in excellent condition, and there need be scarcely a kernel of corn nor a straw of fodder wasted. The average cost of keeping sheep in this way is about $1 a year, and the net profit is about 100 per cent. per annum. The average yield of wool is about four pounds to a sheep. The average price of lambs is about $2, when from three to four months old.

On the Thorndike farm, in this town, there were formerly kept large numbers of sheep, a part of which were imported from Saxony and Spain. The Saxons first deteriorated in our extremely changeable and severe climate, and even the Spanish Merinos did not flourish well. The French Merinos we have never tried. The coarser-wooled breeds are now getting into general use.

Statement of GEORGE W. DRISKO, *of Jonesborough, Washington county, Maine.*

The principal cost of raising sheep here is their keeping through the winter season, which cannot be reckoned higher than $1 a head. Add 50 cents for incidental expenses; the cost of keeping per head for one year is $1 50. Twenty-five Merino and Saxon bloods will shear 75 pounds of wool, worth, at present prices, $26 25. If well kept and in good condition, they will increase their flock in the ratio of 90 per cent. Twenty-two lambs are worth in August $44. At $4 per pair, with the cost of keeping, at the end of one year twenty-five sheep will cost $87 50, while their income for the same period amounts to $70 25, realizing a profitable investment.

Sheep, in this climate, should have a place under cover, where they can pass in and out at pleasure, especially during storms at any season of the year. The refuse straw of the barn should occasionally be spread in the pen, thereby being easily converted into manure.

Statement of HORATIO N. ANDRUS, *of Brandywine, Prince George county, Maryland.*

In 1847, I commenced driving Spanish Merinos, mostly from Vermont, to Virginia, between which and the fall of 1852 I sold upwards of 13,000 for wool-growing purposes. Finding it a profitable business, I established a sheep farm, where I now reside, in the autumn of the following year. I have now on my place 1,000 Spanish Merinos, consisting of about 600 old ewes and 400 lambs, among which are about 20 bucks. The committee on sheep at the agricultural fair, in this county, last fall, awarded me their premium on ewes.

To show that sheep raising in this section of the Union is a profitable business, I would state that my clip in Virginia, of 1850, from 200 ewes, brought, on an average, $1 60 each fleece. They also produced 200 lambs, which sold for $2 62½ each. The cost of keeping, exclusive of superintendence, was about 25 cents a head, feeding each on a gill of corn a day, and this for only ninety days. The rest of the year they took care of themselves.

From a safe calculation, I have arrived at the conclusion, that if 3,000 Spanish Merinos were allowed to multiply for ten years, selling off the old ewes, fat wethers, &c., using the proceeds for the purchase of breeding-ewes to replace those sold, the net profit arising from the sale of the wool, and the value of the whole flock, at the end of that period would amount to the enormous sum of $1,800,000!

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The pure-blooded French and Spanish Merinos are the kinds most preferred, and crosses of the Bakewells, Leicestershires, and South Downs, with our common sheep. The grade of wool here is good, and yearly improving. Many of our wool-growers get their best animals from Vermont. For mutton, the Bakewells and other English sheep are preferred. The cost of raising wool is from 20 to 30 cents a pound.

Statement of J. D. YERKES, *of Northville, Wayne county, Michigan.*

Sheep at present are the most profitable stock kept on our farms. The high price of wool and mutton makes this branch of husbandry a very lucrative business. It is necessary that considerable judgment be exercised in selecting animals to breed from. I believe the Spanish Merinos combine more points of excellence than any other variety which has been introduced into this State. They are of medium size, possessing a strong and vigorous constitution, and carrying a fine and even fleece, very compact on the animal, which enables it to endure our changeable climate with less care and attention than the more open-wooled varieties.

Statement of WILLIAM S. MAYNARD, *of Ann Arbor, Washtenaw county, Michigan.*

Great attention has been paid here of late to the improvement of sheep, especially to enlarge their size and increase the wool, in which

we have been very successful. Several Paular and Spanish Merinos have been brought from Vermont, and some imported—one French Merino buck, the fleece of which at a year old weighed 32 pounds. By a very little care I have increased the average weight of wool on my sheep in four years from 2¾ to 4¼ pounds, which at the last year's price, 55 cents, is quite an item in regard to profits.

The cost of growing wool is from 14 to 20 cents per pound, and the average price for the last three years has been 40 cents.

Statement of THOMAS W. SAMPSON, *of Ashland farm, Rocheport, Boone county, Missouri.*

Every farmer with us has his flock of sheep; but, as a general thing, they are kept only in sufficient numbers to furnish wool for family use. We have some very large flocks, however, numbering from 300 to 3,000 each, among which are several of the improved breeds, as the French and Spanish Merinos, Saxons, Cotswolds, Leicestershires, South Downs, &c.; and this improvement in our stock is showing itself very rapidly, both in the size of the carcass and in the quantity and quality of the fleece. The French Merinos are not generally so much esteemed as the Cotswolds and the South Downs.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

The prices of sheep and their product have been so low until lately, that the efforts at improvement by some of our enterprising farmers have met with small encouragement. With the increased demand for wool, and the consequent demand for sheep, has been renewed the spirit of improved sheep-husbandry. Some very fine specimens of French and Spanish Merinos, and of Cotswolds, were exhibited at our recent State fair, and their owners are anticipating golden returns for the labor and care bestowed on these valuable animals. With us the Merinos are preferred for their fine wool, and the Cotswolds for carcass and wool combined.

The cost of rearing a common sheep is about 40 cents a year, and its value at maturity is about $2. Wool, at present, is worth from 30 to 50 cents per pound.

Statement of H. L. BROWN, *of Fayette, Howard county, Missouri.*

Wool-growing is peculiarly adapted to our location, where land is cheap and labor high; yet but little attention has been paid to it with us. In some of the adjoining counties, many have gone largely into the business, importing the finest stock for that purpose.

Statement of ARMSTRONG O'HARA, *of Saint François county, Missouri.*

No sheep, except the common kind, are raised here. They cost $1 at a year old, and generally sell at $1 50 a head. Their wool is usually sold to be manufactured into cloth and other materials, which are sold for the use of the iron and lead establishments in our section.

Statement of LEVI BARTLETT, *of Warner, Merrimack county, New Hampshire.*

Of sheep, we have, in goodly numbers, the Saxon, Merino, and the "old sort," with a medley of all grades and qualities. Wool-growing and lamb-raising have been a good business for our farmers for a year or two past. They have found a ready cash sale, and good prices, for their wool, mutton, sheep, and lambs.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

The sheep of this county are of almost every grade, from the finest Saxony blood to the coarsest of our native stock. There is at present quite an effort being made to improve our breeds of sheep, but these efforts are made in every different direction. Some are trying to get their sheep up to a larger size, so as to make them more profitable for mutton; while others are crossing with finer grades, in order to produce better wool. There have been some bucks sold here for prices varying from $60 to $200 each.

Formerly, wool-growers entertained the idea that to grow fine wool they must keep small sheep; but now they find that by selecting from the best flocks the largest and finest bucks and ewes, they can improve both the size of their sheep and the quality of their wool. A neighbor of mine has sheared from ten sheep, of his own raising, 100 pounds of fine wool, which he has sold for $50 the past season. Another neighbor has a buck of the French Merino breed, which weighs about 200 pounds, and shears 11¾ pounds of fine wool. A sheep that is large, and has fine wool, is longer lived, and is always hardier and more easily wintered, than a small one.

Statement of JOHN B. YOUNG *and* JAMES DE MOTT, *of Ovid, Seneca county, New York.*

The improvement of our sheep has advanced somewhat, but not equal to that of cattle. The preference is given to the Merino.

Price of wool the past season has ranged from 45 to 50 cents per pound, according to grade; and the average price of good store sheep, from one to three years old, $2 75; if fit for the butcher, $4.

Statement of LEWIS G. MORRIS, *of Mount Fordham, Westchester county, New York.*

The only kind of sheep I raise is the South Down. This variety is what is known in England as the fine mutton sheep, the quality of which is so famous, the lean and fat being well mixed. The wool is of a medium quality, and will always find a ready sale at paying prices. They mature early, keep easy, stand almost any climate, and the ewes are great milkers, which advance their lambs rapidly.

Statement of JOSHUA HARRIS, *of Welche's Mills, Cabarras county, North Carolina.*

There is little or no attention paid to the raising of sheep in this region. The devouring dogs have been so destructive on them that many farmers have abandoned the business, and buy their woolen goods for winter apparel at the North.

Statement of JACOB KNOOP, *of Elizabeth, Miami county, Ohio.*

More attention is now paid here to raising wool than formerly. We have many small flocks of very fine Saxony and Merino sheep, which are worth from $2 50 to $3 a head. We have recently introduced some of the French Merinos, which are considered an excellent cross by increasing the size of the sheep. Wool is worth with us 50 cents per pound.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

Sheep need no care save guarding against the wolves. The ewes bring two lambs usually, and twice a year. Wool is worth 25 cents per pound. Our clothing comes from the East; but we save the wool. Sheep are worth $10 per head.

Statement of H. A. CASE, *of Troy, Bradford county, Pennsylvania.*

Sheep husbandry is beginning to attract that attention here it so well deserves. The high price of wool; the great value of sheep in keeping down briers and other foul stuff, and in renovating the land, together with the advanced price of mutton, all conspire to increase its importance; so that the desire to engage in this branch of rural economy is becoming general. With us it is as yet in its infancy. The Merino, crossed with our common breeds, is the material of which our flocks are mostly composed.

The average price of wool for the past ten years is 28 cents per pound; price in 1853, 41 cents.

Statement of N. LINTON, *Cochransville, Chester county, Pennsylvania.*

Wethers are bought out of droves and fattened here for market; and ewes with us are almost always raised with profit, each, with proper care, producing, on an average, one lamb a year, which will sell for from $2 to $3 each at six months old. Each ewe yields from three to five pounds of wool per annum; which, when washed, sells for 40 cents per pound. When fat, they will often sell for more than the first cost, which is sometimes $6 a head.

Statement of JOHN EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

The rearing of sheep has been neglected with us. The small Spanish Merino and the common stock of the county are the only ones

raised, with the exception of a few Cotswolds, South Downs, and French Merinos, which have lately been introduced.

The average price of common wool here is 45 cents; of Merino 60 cents.

Statement of E. F. GILBERT, *of Matagorda, Matagorda county, Texas.*

Some attempts have recently been made to grow sheep on the coast ranges on the western side of our bay; and although we had had some grounds for sanguine hope of its practicability from previous experiments, we regret to learn, recently, from those who engaged in the business, that it does not succeed well. The sheep sicken and die in large numbers—whether from disease contracted in the low altitude, or from deleterious gases of the locality, is not known. On the opposite or peninsular side of the bay, which is more elevated, they appear to succeed better.

With regard to the price of the different grades of sheep in Texas, we are scarcely enabled to give a definite answer. In this county there are not more than 4,000 or 5,000 altogether, and I know of none for sale. They are principally crosses of the Merino and South Down with the Mexican, and may probably be estimated worth $2 50 per head. In the neighborhood of San Antonio, Mexican sheep can be purchased at $1 and $1 25 per head, perhaps less just now, as I understand that large droves have recently passed over the Rio Grande into Texas. Some few of the improved breeds have recently been imported into the State by stock-raisers. Sheep of this description would bring a good price in Texas, and emigrants designing to engage in the business here should bring a stock to commence with. Merinos, for several reasons, are considered best suited to our climate. They possess strength of lungs and limbs, and, being originally from a warm temperature, are easily acclimatized. Practical experience has established the fact that sheep are not necessarily inhabitants of the snow-clad regions, but, on the contrary, are found to improve in vigor and wool in the lower latitudes. Thus, every advantage considered, the prairies of Western Texas present the best facilities for sheep-raising of any part of the world.

Statement of JOSEPH PARKER, *of West Rupert, Bennington county, Vermont.*

The yearly expense of keeping a sheep here is about $1 30; and the average product in wool of each per annum, at 50 to 65 cents per pound, is about $2. The cost of transportation to market by railroad is 10 cents per 100 pounds.

Statement of JOSEPH BOWDITCH, *of Fairfield, Franklin county, Vermont.*

Our dairymen keep sheep only sufficient for family use. They are a mixture of the common breed of the country and Spanish Merinos, with a strain of the English intermixed. I undertook, some years since, to improve the breed of my sheep, which consisted of three-fourths Merino, with a cross by an imported Yorkshire ram. Some of the

progeny had the large, symmetrical form of the sire, with his long, thin wool, while others were the *fac simile* of the dam. In process of time the size of the sheep increased, but they did not grow that fine silky fleece. In the fall of 1852, I killed two three-year-old and one yearling sheep and took from the three 82 pounds of tallow. Where but few sheep are kept, our common and English breeds are most profitable. There are also a few valuable flocks of fine-wooled sheep kept in this county.

Statement of H. W. Lester, *of Rutland, Rutland county, Vermont.*

Of sheep, the Spanish Merinos are the best and most profitable, with a common chance. In large flocks, fleece wool washed on the sheep can be raised for 40 cents per pound. It is carried to Boston market by railroad for about $7 per ton.

Statement of Henry M. Price, *of Nicholas Court House, Virginia.*

No country in the world is better adapted to the successful raising of sheep than this county; and I am pleased to say that more and more attention is paid to them, and the flocks are gradually enlarging. All that is wanting, is for men of energy, enterprise, industry, capital, and experience in breeds by crossing, to settle among us, to render wool our chief staple, and the amount annually sold greater than that from any other county in the Union. I have seen no region in which they seem to thrive so well, with so little attention.

Statement of Gustavus de Neven, *of Fond du Lac, Fond du Lac county, Wisconsin.*

Sufficient attention has not been paid with us to the rearing of sheep; and it is somewhat singular that but few of our farmers as yet own a good flock of them. It is, however, unquestionable that few branches of husbandry would reward the farmer so well as the raising of wool. Sheep thrive admirably on the prairies, or on our wood-land openings. The fleeces are quite heavy, and the mutton unsurpassed. When it is considered, too, that the price of transportation to an Eastern market is lighter on wool, in proportion to its value, than any other Western product, it is surprising that our farmers do not engage more extensively in this branch. One of the causes, perhaps the only cause, has been that sheep have been difficult to procure. Few droves have as yet been brought here, although, when so brought, they have sold very rapidly, and would now command good prices. Wool, this fall, has been worth about 50 cents per pound.

Statement of Philander Judson, *of Liberty, Kenosha county, Wisconsin.*

Wool-growing, with us, is receiving increased attention. The great mass of sheep are grades between the common and the Saxony and Merino, though there are a few flocks where may be found animals of pure Saxony and Merino breeds. The cost a head of keeping sheep through the year is 50 cents; weight of wool a head, from 2¾ to 5

pounds—many flocks not averaging more than the former, but some as high as the latter figure. From grade sheep, 3¼ pounds I think near the general average. The improvement in the price of wool the past season has stimulated wool-growers in the right direction. Many of the pure and mixed French and Spanish Merinos have been introduced into this section, principally from Vermont—no doubt, ultimately, much to the benefit of the producer.

The price of wool, the last clip, in Kenosha, was from 35 to 50 cents per pound.

SWINE.

The first swine introduced into America were probably brought from Spain to Hispaniola, by Columbus, in his second voyage, in 1493; for, as a portion of his cargoes consisted of horses, cattle, seeds, plants, &c., it is not likely that he would have omitted so common an animal as the hog.

The first person, so far as we know, who imported swine into what now constitutes a part of the United States, was Ferdinand De Soto, in 1538. He brought them from Cuba to Florida with a cargo of horses, among which were thirteen sows, the progeny of the latter soon increasing to several hundred.

The Portuguese took cattle and swine to Nova Scotia and Newfoundland in the year 1553. Thirty years after, they had multiplied in such abundance that Sir Richard Gilbert, in attempting to land on that island to obtain supplies of cattle and hogs for his crew, was wrecked. Swine and other domestic animals were brought to Acadia by L'Escarbot, in 1604, the year that country was settled. In 1608, the French extended their settlement into Canada, and soon after introduced various animals, among which, probably, there were swine.

In 1591, the British ship "Henry May" was wrecked on Bermuda, at which time the surviving crew found that island swarming with wild black hogs, though not a single human being was living there. It is supposed that these swine were the descendants from those which had belonged to some vessel that had been cast away there many years before, as several Spanish and Dutch wrecks were found on the shore.

The first swine introduced into Virginia was by the "London Company," in 1609. They consisted of six hundred in number, and multiplied so rapidly in the colony, that in 1627 the people were obliged to palisade Jamestown to prevent being overrun by them. In 1627, the Indians near the settlement fed upon hogs that had become wild in the forest, without number, instead of game. Every family in Virginia, at that time, who had not an abundance of tame hogs and poultry, was considered very poor. In 1733, which was a good meat year, one planter in Virginia salted down 3,000 barrels of pork.

On the authority of Captain John Smith, of Virginia, swine were first introduced into the colony of Massachusetts Bay in 1624. They are mentioned as thriving on fowl meadow-grass in 1629, which grew wild in that vicinity, and was also relished by the horses, cows, and goats. In 1650, the price of a yearling sow was from $4 80 to $5 60.

The first importation into New Netherland was made from Holland, in 1625, by the "Dutch West India Company." In 1644, the price of a yearling sow in that colony was from $8 to $10. In 1671, hogs fattened well there in the woods, but those fed on Indian corn made sweeter pork.

Hogs were abundant on the Illinois river prior to 1750.

The first swine of which we can find any reliable account as having made much improvement in the breeds in the United States, was a pair of pigs sent by the Duke of Bedford to General Washington, by a Mr. Parkinson, an English farmer, who came to this country towards the close of the last century. He leased a farm in the vicinity of Baltimore, in Maryland, where he resided for some time. Instead of delivering these pigs to Washington, he dishonestly sold them. They were generally called the "Woburn" or "Bedford" breed; but in some districts in this country, they were known by the name of the "Parkinson hog." This breed originated at Woburn, the estate of the Duke of Bedford, produced by a cross of a Chinese boar on the large English hog. When bred in perfection, they were splendid animals, being fine in their points, of a deep round carcass, with short legs and thin hair. They kept easily and matured early, weighing, at twelve to twenty months, from 300 to 700 pounds, having light offal, and meat of the first quality. Their color was white, broken more or less with dark-blue or ash-colored spots. At one period, they were widely diffused in Maryland and the border counties of Virginia, as well as in Delaware and Pennsylvania; but it is believed that the purity of the breed no longer exists, either in England or this country. General Ridgely, of Maryland, bred these hogs in perfection. He sent a pair to Hon. Timothy Pickering, of Salem, Massachusetts, the descendants of which and their crosses, were extensively propagated in this as well as the adjoining States.

The amount of pork exported from Charleston, South Carolina, in 1747–48, was 3,114 barrels; in 1754, 1,560 barrels; from Philadelphia, in 1752, 4,812 barrels; in 1767, 6,647 barrels; in 1796, 12,029 barrels, besides 1,082,690 pounds of ham; from Savannah, in 1755, 20 barrels; in 1760, 8 barrels; in 1770, 521 barrels. The annual amount exported from Virginia for several years preceding the Revolution, was about 4,000 barrels.

The total exports of pork from the United States in 1791, was 27,781 barrels; in 1800, 55,467 barrels; in 1810, 37,209 barrels; in 1815, 9,073 barrels.

The following table shows the number of swine and the quantities of pork, bacon, and ham, with their valuations, exported from the United States for the last thirty-three years:

Years.	Hogs.	Pork.	Bacon & hams.	Lard.	Value.
	Number.	Barrels.	Pounds.	Pounds.	Dollars.
1820-21	7,885	66,647	1,607,506	3,996,561	1,354,116
1821-22	9,793	68,352	1,142,945	4,137,814	1,357,899
1822-23	11,436	55,529	1,637,157	6,067,071	1,291,322
1823-24	8,838	67,229	1,409,199	5,053,182	1,489,051
1824-25	4,525	85,709	1,896,359	5,483,048	1,832,679
1825-26	6,939	88,994	1,836,133	7,231,643	1,892,429
1826-27	18,441	73,813	1,864,956	6,927,084	1,555,698
1827-28	16,171	53,836	1,837,920	7,493,319	1,495,830
1828-29	10,779	59,539	2,305,405	7,154,742	1,493,629
1829-30	22,294	45,645	2,154,986	6,001,417	1,315,245
1830-31	14,690	51,263	1,477,446	6,963,516	1,501,644
1831-32	5,266	88,625	1,810,830	7,756,782	1,928,196
1832-33	6,819	105,870	1,786,637	7,655,198	2,151,558
1833-34	3,338	82,691	1,520,638	9,050,342	1,796,001
1834-35	3,930	61,827	1,492,027	10,637,490	1,776,732
1835-36	1,231	22,550	1,398,475	6,493,878	1,383,344
1836-37	1,110	24,583	965,935	6,388,174	1,299,796
1837-38	366	31,356	1,194,890	7,209,478	1,312,346
1838-39	772	41,301	1,445,527	7,723,834	1,777,230
1839-40	4,854	66,281	1,643,397	7,418,847	1,894,894
1840-41	7,901	133,290	2,794,517	10,597,654	2,621,537
1841-42	5,564	180,032	2,518,841	20,102,397	2,629,403
1842-43	7,162	80,310	2,422,067	24,534,217	2,120,020
1843-44	9,615	161,629	3,886,976	25,746,355	3,236,479
1844-45	6,384	161,609	2,719,360	20,060,993	2,991,284
1845-46	7,437	190,422	3,006,630	21,843,164	3,883,884
1846-47	3,274	206,190	17,921,471	37,611,161	6,630,842
1847-48	4,750	248,269	33,551,034	49,625,539	9,003,272
1848-49	1,121	253,486	56,060,822	37,446,761	9,245,885
1849-50	881	881,841	41,014,528	54,925,546	7,550,287
1850-51	1,030	165,206	18,027,302	19,683,082	4,368,015
1851-52	185	83,382	5,746,816	21,281,951	3,765,470
1852-53	22	129,881	18,390,027	24,435,014	6,202,324

According to the census returns of 1840, there were in the United States 26,301,293 swine; of 1850, there were 30,354,213; showing an increase of 4,052,920. The present number may be estimated at 32,000,000; which, at $5 each, would be worth $160,000,000.

CONDENSED CORRESPONDENCE.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

It is a question, I believe, not yet settled to the satisfaction of farmers, whether corn ground or fed raw to swine will make more pork than when cooked. Ten bushels judiciously fed, according to my experience, will make 100 pounds of pork.

Statement of J. E. McCLUNG, *of Bloomington, McLean county, Illinois.*

The Berkshire and Irish grazier are the best breeds of hogs grown among us. The cheapest manner of raising pork is a rotation of clover, oats, and rye fields, to graze upon through the summer. The best manner to fatten is, to grind their grain, and let the meal undergo a partial fermentation in tubs prepared for the purpose.

Statement of WILLIAM J. PHELPS, *of Elmwood, Peoria county, Illinois.*

Hogs with us in the spring are turned into a clover field, with plenty of salt, and light feeding of corn, where they remain until about the 10th of July, when they are turned into a field of oats to keep themselves. These last them a month or six weeks, when the feeding on corn commences. First, and for a time, it is cut and hauled to them while the stalk is green and juicy, and both stalk and ear are eaten with a high relish. During all this time the animal has been growing thriftily, developing in size, bone, and stamina; and is in the best condition, as the corn ripens and hardens, to lay on fat with rapidity. The closing period of feeding in November and December upon ripe grain gives to the flesh the purest and most desirable character. Thus, with comparatively little labor, at a cost of about eight or ten bushels of corn, or its equivalent in other food, for every 100 pounds, we produce pork in the open fields, with temporary shelter towards the close, and find it remunerative even at the lowest rates. Hogs properly cared for in this way, will weigh at twenty months old from 200 to 400 pounds.

Statement of WILLIAM S. PAYNE, *of Rushville, Rush county, Indiana.*

Pork-raising in this county is carried on extensively. Some farmers fatten from 500 to 3,000 hogs in a year. There have been a good many foreign hogs introduced among us, but, after being here a few years, they have lost their original identity, and are now scarcely known by any other name than "hog."

The question might be asked, How does one man fatten 3,000 hogs at one time? I answer, he turns them into a field of standing corn about the 1st of September; and when they devour the contents of that field they are turned into another, and so on until they are considered fat enough for market, which takes eighty or ninety days. This is what we call "hogging down corn." One hundred acres of good corn, say fifty bushels to the acre, will fatten about 350 hogs.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

There is some diversity of opinion as to the comparative value of the different breeds of hogs; the Berkshire, Irish grazier, and Woburn, however, are considered the best. They require but little further attention or feeding to keep them fat or in good order, than to let them run on blue-grass and clover pasture; giving them during the winter

G. L. MARTIN'S LIBRARY

an ear or two of corn morning and evening, or its equivalent in something else.

When it is considered that hogs can be employed to advantage in gleaning the fields after harvest, and in eating much offal which otherwise would be lost, in connexion with present prices, the conclusion must be that they are very profitable stock. They can be raised at a net cost of $2 25 per hundred. When about eighteen or twenty months old, they are fattened for market; and it is estimated that, during the time or process of fattening, one bushel of corn will make ten pounds of pork. If the corn were ground and cooked, it would go from 25 to 30 per cent. further.

For packing, hogs must weigh over 220 pounds, live weight; but the general average commonly in market is over 300 pounds, worth from $3 50 to $4 per hundred. Small hogs for family pork are worth from 50 to 75 cents per hundred less.

Statement of WILLIAM UPTON, JR., *of Dixmont, Penobscot county, Maine.*

Of hogs, various breeds have been introduced at times with good success—such as the Berkshire, Bedford, Newbury White ; and more recently the Suffolk has made his appearance. These various kinds are crossed in every imaginable way, so that the long-nosed, slab-sided racer, formerly predominant here, has gradually given place to more compact, valuable breeds ; and the average weight now at eighteen months old is not far from 350 pounds, and not unfrequently, with superior feed, go up to 600 pounds. They are usually kept in close pens, and fed with slops from the house, refuse of the dairy, and decayed potatoes—of which we are sorry to say there is no lack this year—till it is designed to fatten, when they are fed with Indian meal, prepared by grinding the corn and cobs together without shelling. This is usually mixed with hot boiled potatoes and skimmed milk, and given to them warm.

For the last four or five years, round hogs have been worth in Bangor, our nearest market, 8½ cents per pound. Pork is largely imported into this part of the State to supply the heavy lumbering operations carried on here. It will be readily perceived, from what has been said of the method of feeding, that any statement of the cost of production of this article must be mere conjecture. All we can say about it is, that, kept in suitable quantities to eat the refuse of the house, dairy, &c., they are profitable; further than this, with corn from 75 cents to $1 per bushel, they are decidedly unprofitable.

Statement of W. T. G. MORTON, *of West Needham, Norfolk county, Massachusetts.*

My herd of swine are entirely of the pure Suffolk breed. It consists of thirty-seven sows, twenty-five of which are now (December 31) with pigs, and six boars, two of them in active service. My oldest boar, "Prince Albert," at fifteen months old, took the first premium, last season, (1853,) at the Norfolk county Agricultural Society.

In point of economy, I have found by experience that this breed of

hogs is much easier kept, and takes on fat faster, and at less expense, than any other known. There is much less waste in cutting them up for the barrel, and the pork is sweeter, more delicate, and is considered far better for family use, than that of any other breed. They are of a white color, very perfect in all of their points, being of a medium size, with deep, full chests, round bodies, thick hams, and short legs. They are docile, thrifty, and mature early, weighing, at twelve to eighteen months old, from 200 to 450, and occasionally as high as 500 pounds. I commence fattening my swine in October, and slaughter at about Christmas.

I have found no difficulty in breeding these hogs; on the contrary, I have been successful in producing three consecutive litters.

Statement of THOMAS W. SAMPSON, *of Ashland Farm, Rocheport, Boone county, Missouri.*

Hogs are raised in this county with but little trouble. They are fattened entirely on corn, except where we have what is called a "mast year;" then they get fat in the woods on acorns; but the meat is not fit for exportation, nor scarcely for home use, as the flesh is very oily and soft. The Berkshire and Irish grazier are the only improved breeds we have had among us. The Berkshires are too small, and the Irish too slow in maturing. A cross between the two is the best hog we have for all purposes.

Our hogs are kept only in what is called good living order until they are put up to fatten, which is about the 1st of October, when they are fed on all the corn they will eat until slaughtering time, or about the 1st of December. A considerable number of large lots of fine hogs are also fattened and sold to packers.

Pork is worth, on an average, about $3 per hundred.

Statement of JAMES L. MINOR, *of Jefferson City, Cole courty, Missouri.*

Hogs are generally killed here at about eighteen months or two years old. They are usually permitted to run in the woods and around the stables and farm until about three months before killing time, when they are put up in a pen, where new corn is thrown to them *ad libitum*, until they are fat enough to be slaughtered. In this condition they are either put up by the farmers, after a sufficient supply is retained for their domestic consumption, in the hope of a bacon speculation in the spring of the next year, or sold to some pork-house in the vicinity. The opinion prevails that no hog can be profitably kept more than one winter. Presuming that he is killed at eighteen or twenty months old, a hog will consume, in that time, about four barrels of corn. At this age, and with this quantity of food, he will weigh from 160 to 200 pounds. Corn is worth here, generally, $1 per barrel, so that the estimate of the cost of production and profit of pork is easily made:

175 pounds (average) of pork, at 4 cents	$7 00
Cost of food	4 00
Profit	3 00

Statement of W. M. JACKSON, *of Fayette, Howard county, Missouri.*

I have tried the Byfield, the Irish, and the Berkshire, all of which are thrifty and do well. The Irish I object to on account of his large bone, and consequent size. I consider them not so profitable hogs as either of the other kinds. They do not take on flesh so young as the others; and the sooner hogs can be made to weigh 200 pounds, the more the profit; and those which are made to weigh 200 pounds at ten or twelve months old, are certainly much better meat than those which are kept so poor as only to weigh 200 pounds at two years old. The meat of a young hog fattened at that age, is certainly more tender, has thinner rind and less gristle, and consequently is better tasted, and is worth more. A hog twelve months old, say the 1st of September, which will weigh 175 pounds, will take on flesh at the rate of two pounds a day; and five bushels of good sound new corn will make an increase or average gain of 75 pounds on hogs of the above description; or, $3\frac{3}{4}$ pounds of corn, supposing the corn to weigh 55 pounds to the bushel, will make one of pork. I make this statement from an actual experiment which I know to be correct. I have never tried grinding the grain, nor cooking it in any way, for hogs; and I feel confident, from observation and experience in fattening hogs, that there is no preparation that can be made by grinding and cooking that will fatten them faster than green corn in the field, just after the milky stage, and so well calculated to prevent the exhaustion of the land. I have raised eight successive crops of corn on the same field and fed it down with hogs, and I am sure that the last was the heaviest corn I have ever noticed. By this process of feeding, my pigs and shoats all get fat, and are easily wintered.

Statement of D. C. GARTH, *of Huntsville, Randolph county, Missouri.*

Hogs are raised here mainly for home consumption, and very few are driven or carried to market. Enough are annually slaughtered, however, to produce a surplus of bacon and lard, which constitute a portion of our commercial commodities.

Statement of ARMSTRONG O'HARA, *of St. François county, Missouri.*

Every farmer here raises his own pork, and the surplus is sold in our home trade. Pork, to raise it here on corn, will cost $3 per hundred, and sells at $4.

Statement of LEVI BARTLETT, *of Warner, Merrimack county, New Hampshire.*

Of swine, we have good, bad, and indifferent, resulting from neglect of any systematic course of breeding. Among our farmers and mechanics we frequently find specimens of hogs that will compare favorably, in every respect, with the Suffolk, or in fact with any other breed. But these good points in individuals cannot be depended upon in all the pigs of the same litter, or even in the progeny of these almost faultless

grunters. Some of their pigs may be extremely good, some indifferently so, and others decidedly bad—looking as if their "base, ignoble blood had crept through land-sharks ever since the flood." Where the "kith and kin" are so nearly allied, why such a difference? Simply because there has been no systematic course of breeding pursued among us long enough to "fix" any peculiarity of "blood." It is a general law of nature for "like to beget like;" and by a long and judicious course of breeding, a race of cattle, sheep, or swine can be produced, the progeny of which will almost as nearly resemble each other as do a brood of our native quails or partridges. In England, where the true principles of breeding have been pursued with the greatest care for a long series of years, they have several very valuable and distinctly-marked varieties of hogs, each of which, when kept pure, preserving its identity generation after generation. Among some of the most valuable breeds are the Middlesex, the Woburn, the improved Essex, and the Suffolk. The latter have been more largely introduced into this section of the country than any of the other kinds; and for the farmers and mechanics of New Hampshire they are thought to be, or the half-bloods, a much better breed than the mixed varieties now so generally kept; for the Suffolks are not large, coarse, bony hogs, but attain maturity at an early age, and may be always in a condition to kill from the time they are a month old. They readily weigh from 200 to 300 pounds at six to ten months old, and a proportionate weight at twelve months. The pork is so much esteemed, that it generally commands from a cent to two cents a pound extra in the Boston market.

Statement of WILLIAM H. COOKE, *of Howard, Warren county, New York.*

Our best breed of hogs is the Berkshire, crossed with our common stock. The cheapest method of raising pork is, to have the pigs come early in the spring, forcing them, by good feeding, from the commencement, and at eight months old they will weigh about 300 pounds. This can be done by keeping one pig to each cow, and mixing a little Indian meal or ground rye with the buttermilk or whey.

The price of pork thus raised is about 7 cents per pound.

Statement of LEWIS G. MORRIS, *of Mount Fordham, Westchester county, New York.*

The three kinds of swine propagated by me are the improved Suffolk, Essex, and Berkshire. The modern Suffolk is a valuable and popular breed. Its origin was a cross of the ancient breed of Suffolk (England) with the Chinese and Berkshire. Youatt says: "On the whole, there are few better breeds in the kingdom than the improved Suffolk." Martin says, "This breed stands first;" and Rahm says, "Suffolk pigs are, perhaps, on the whole, the most popular breed in England." It differs from the Essex, in making more fat and less lean, being better adapted to barreling, and not so good for baconing, or as fresh pork. The Suffolks attain maturity at an early age, and may always be in condition to kill from the time they are a month old. Their usual weight is from 200 to 300 pounds at six to ten months old,

and a proportionate weight at twelve months. The carcasses command a considerable extra price over the common hogs of the country, partly on account of the greater weight in proportion to the bone, but chiefly from the pork being of better quality and flavor.

The improved Essex is one of the most valuable breeds of swine. It was originated by the late Lord Western, and has latterly been extensively known in the hands of W. Fisher Hobbs, who was Lord W.'s bailiff, and had facilities for obtaining his best stock. It has probably carried more prizes at the shows of the Smithfield Club, within the last ten years, than any other breed. It was derived from a cross with the Neapolitan, and inherits the black color of that race, with more size, finer symmetry, and much better constitution. Stephens, author of the "Book of the Farm," and the "Farmer's Guide," well describes their characteristics as follows: "As to the breed which shows the greatest disposition to fatten, together with a due proportion of lean, I never saw one equal to that which was originated by Lord Western, in Essex. They were exceedingly gentle; indisposed to travel far; could attain, if kept on, to a great weight; and so compact in form, and small of bone and offal, that they invariably yielded a greater weight of pork than was judged of before being slaughtered, and more delicious ham was never cured than they afforded." In regard to color, it may be observed that, in this case, it is not even "skin-deep," being confined to the outer or scarf-skin; and the carcasses, dressed by the ordinary mode of scalding, are quite white. The meat is of very superior quality, the fat being firm, and the lean white, fine-grained and rich flavored. The animals are not subject to cutaneous diseases. Their skins are almost always smooth and healthy, even when exposed to the sun. Few of the breed have as yet been slaughtered in this country. Their dressed weight in England is 250 to 400 pounds at twelve to eighteen months old.

The Berkshires, black and white, possess more size than either of the above named breeds, with much more bristles or hair. The meat has more muscle, or lean, and by some is thought to be better adapted for bacon and hams.

Statement of Joshua Harris, *of Welche's Mills, Cabarras county, North Carolina.*

Every farmer here tries to raise his own pork, but very often fails, and has to buy from the drovers.

Statement of Jacob Knoop, *of Elizabeth, Miami county, Ohio.*

We have several breeds of excellent hogs, such as the "Liecester," the "Berkshire," the "grazier," and the "Warren county" or "Shaker," the latter of which is raised in Union village by a long and judicious crossing of our best kinds. With good feed and care, they will weigh from 300 to 400 pounds each, at sixteen months old, or from 200 to 250 pounds at eleven months old.

The price of pork varies from $3 75 to $4 25 per hundred, which will not remunerate the farmer for his labor and corn.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

Hogs do well here, and are not fed at any season of the year. They live on a root growing in the lowlands, known as "cameros," resembling an onion. The oak yields a fine crop of acorns, upon which they also feed.

Statement of PETER GROSS, *of Schnecksville, Lehigh county, Pennsylvania.*

Pork raising for the market is not generally a profitable business with us. The best breeds raised are a mixture of the Berkshire and our common stock. But few hogs are raised and fattened except those required for family use. Our cheapest method of raising is to swill the hogs liberally during the summer, and let them glean the stubble-fields and run at large in the orchards. In the fall, when corn begins to harden, we commence feeding them moderately until about the 1st of November, after which they should have all they will eat until the latter part of December. When slaughtered at sixteen months old, they will average about 250 to 300 pounds each in weight.

Pork, at present, is worth $7 per hundred.

Statement of JOSHUA S. KELLER, *of Orwigsburg, Schuylkill county, Pennsylvania.*

There are some good breeds of hogs in this county, among which are the Suffolks, of which I possess a pair. They are unquestionably the best breed we have, possessing a fine bone, neat appearance, and fatten readily at any age. They come to maturity at from twelve to fifteen months old, at which age they weigh from 250 to 350 pounds. I am well satisfied 50 per cent. can be saved in keeping this breed.

Statement of JOHN S. EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

But little attention has been given to this branch of agriculture in Western Pennsylvania, although the demand for pork, for several years, has been good, and prices have run high. The course usually adopted by most farmers in this section, is to keep their hogs until they are from eighteen to twenty-two months old, and then slaughter or sell them. During their first winter, they are fed just sufficient to keep them alive. The second summer they have the run of a clover-field, and in the fall they are allowed the range of the orchard and woods. Six weeks before killing time, they are penned up and provided with as much corn, in the ear, as they can destroy, and they certainly will "destroy" the third of what is given them. At the end of six weeks, they are killed or sold, averaging in weight about 250 pounds dressed. This pork costs us, counting all expenses, 10 cents per pound; which is certainly not a very profitable business when it can be bought for 5 cents.

Decidedly the best way of fattening hogs, is to get a corn and cob-crusher, and a vegetable boiler to steam the corn after it has been crushed. This plan is far better than shelling the corn and drawing it from one to five miles to a mill, giving the miller one-tenth of the grist,

and then drawing it home. We have tried the Berkshire, the Irish grazier, and most of the ordinary kinds, none of which have given satisfaction. The Berkshire and common breeds are too small; the grazier requires too long a period to come to maturity. I am now breeding from a cross of the Berkshire and grazier, which are called "improved graziers." They combine the early maturity and easy fattening properties of the Berkshire, with the great size of the grazier. From this cross, I can have pigs farrowed the 1st of March, which will weigh, with ordinary care, 200 pounds by Christmas; thus avoiding the expense of feeding over winter, which is the great drawback in raising swine. Pork made in this way will cost a third less than it does in the case first mentioned.

Statement of JOSEPH BOWDITCH, *of Fairfield, Franklin county, Vermont.*

All of our dairymen make pork to sell. Our hogs, eighteen months old, when dressed, weigh from 300 to 500 pounds; pigs from 200 to 300 pounds each. At least four-fifths of our pork is made from the refuse of the dairy. Some confine their hogs in pens, keeping charcoal by them; others have a small yard attached, for them to root and wallow in. In the latter part of the dairy season, as the slops decrease, the deficiency is supplied by potatoes, apples, pumpkins, and corn-meal. Cows which are kept for butter will make 60 pounds of pork each in a season; when kept for cheese, 40 pounds. The Suffolk breed is generally preferred, as they mature younger.

Statement of WILLIAM SMOOT, *of Boone Court House, Virginia.*

The Berkshire and grazier, mixed with our "scrub" hogs, constitute our best breed. They do better on clover, running at large, than when confined.

Pork is worth from 4 to 5 cents per pound, but will not pay costs for less than 3 cents.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

We only raise meat for our own use, not yet deeming it so profitable for sale as other things. We have the Virginia, the Berkshire, and the Irish grazier, both pure and mixed. Our hogs take the range during the year, being called up once or twice daily and fed on slops, corn, pumpkins, &c. They are fattened on the same food, being closely penned about two months. They are slaughtered in December and January, their average weight being about 140 pounds. They are worth in pork 5, and in bacon 12½ cents per pound. The cost of rearing and fattening is supposed to be about 4½ cents per pound.

Statement of HENRY M. PRICE, *of Nicholas Court House, Virginia.*

But little attention, as yet, is paid here to the breeds of swine, though our common stock makes fair pork. They are usually "mast" fed. No surplus pork nor bacon of much consequence is raised.

ETHERIZATION OF ANIMALS.

BY CHARLES T. JACKSON, M. D., OF BOSTON, MASS.

In the winter of 1841–42, I discovered that the nerves of sensation could be temporarily paralyzed to all sensation by the pulmonary inhalation of the vapor of pure sulphuric ether (oxide of ethyle) mixed with air, and that while the human body was thus affected, any surgical operation could be performed upon the etherized patient without producing any pain. In 1846, I caused this discovery to be practically exemplified, by applying it in surgical operations, both in this country and in Europe, where it was also used by my directions. I also indicated its use in preventing all sensation of pain in domestic animals, upon which surgical operations were to be performed, either for the cure of diseases, or for rendering them more serviceable to man.

In many cases, fractured or dislocated limbs of valuable animals could be cured if they were rendered manageable during the operation, so that the proper adjustments might be made, and the dressings applied. This may readily be accomplished by rendering the animal insensible to pain, and unconscious by the administration of ether vapor. Severe surgical operations—such as the division of nerves, the application of actual cautery, the removal of tumors, and the castration of domestic animals—may also be rendered entirely painless by this method. The means is easy, safe, and efficient, and any intelligent person can administer the ether as I shall describe.

We may make use of pure washed sulphuric ether, or of a mixture of it with chloroform, the mixture being preferable on account of its greater power and concentration, while pure chloroform is dangerous and ought not to be employed alone, its vapor being so dense as to be with difficulty removed from the lungs in case an overdose is administered, while sulphuric ether vapor is light, and is easily removed. The mixed vapors also act more kindly, on account of the slightly stimulating property of the ether overcoming the deadly sedative effect of pure chloroform. In actual practice, I have never known of a single fatal accident from the administration of the vapor, nor of this mixture, provided air was also admitted into the lungs, mingled with the vapor so as to sustain the functions of life as required for respiration. No unpleasant accident has ever happened under my hands from the administration of either of these anæsthetic agents, though my experience has been most extensive, and my observations have been made on persons of all ages and temperaments. I have found that a mixture of four or five measures of pure sulphuric ether, and of one measure of pure chloroform, produced the best effects upon man and upon animals.

In the more usual surgical operations upon animals, particularly in that of castration of the bull, stallion, hog, and ram, we should always

apply the ether vapor by the lungs. There is no danger in administering the ether to any animal that has sensible perspiration; but to those which do not sweat, we must apply it more cautiously; thus the ram and bull will bear a very high dose without the least danger to life, while the *cat* is readily killed by a full dose of chloroform. I have not seen death produced by the use of pure ether vapor mixed with air, in any case, nor in any animal, and yet I can conceive how an animal having no free perspiration should retain for a longer time the absorbed vapor of that liquid, as well as of chloroform. Dogs have a perspiration mainly from the tongue, and hence they do not get rid of the absorbed vapor so readily as those animals having a free cutaneous perspiration, and are therefore more likely to suffer ill effects from retained chloroform. All animals excrete the absorbed vapor by the skin, lungs, and kidneys, in their perspiration, breath, and urine; and thus, after the effects of the anæsthetic agent is over, the system clears itself very soon of all traces of it by the above named channels.

In administering ether and chloroform to animals, I make use of a wire muzzle, or basket, which is fastened round the nose and mouth, and fixed in its place by proper straps. On the horse or ox, a headstall is all that is required to fix the wire basket in its proper position. Into this basket I first put a very coarse open-textured sponge, which has been soaked in water so as to soften and swell it, and then it is squeezed dry. The basket and sponge being put in the proper position, I take this mixture—pure sulphuric ether, one pint; pure chloroform, one gill—and mix them in a bottle; then I pour upon the sponge, from time to time as needed, this fluid, an ounce at a time; renewing it as it evaporates. The animal breathes it freely into the lungs, and soon gently falls down in a deep sleep of insensibility and unconsciousness, and is entirely passive, so that any operation may be performed, and without any struggle of the animal, or any signs of pain. A very refractory horse may, by this means, be made to submit to the farrier in being shod, and will soon learn to submit afterwards, and probably without the repetition of the ether.

The apparatus for etherizing a bull, will, of course, be fitted to the form of his nose, and should be in other respects like that for the horse. He will bear the ether perfectly well in full doses.

The hog I have not seen under etherization, but I doubt not he will readily come under its influence; but I do not think he will bear so well a high dose as a horse or an ox.

Sheep bear it perfectly well; at least they do the breathing of pure ether. I do not know how chloroform may affect them, and should be a little more careful in the administration of that agent. It is probable, however, that the admixture of chloroform with ether will prove safe and efficient. Sheep have been operated upon under ether in England successfully, since the publication of my discovery.

It must be kept in view, that air must be freely admitted in administering all anæsthetical agents; then there is little if any danger to be feared.

In this hasty sketch of the method of etherizing animals, I have avoided many details which might prove entertaining to the reader, and an array of cases that might have been required at the time I first

made this curious discovery known to the world, but which are now unnecessary, since the public know that the effects have been produced in hundreds of thousands of cases in Europe, Asia, and America in all lands where I have made known this means of alleviating suffering.

IMPORTATION OF CAMELS.

The introduction of the camel, to be employed as a beast of burden in those portions of the Western hemisphere where there are broad prairies and elevated plains nearly destitute of water, and offering but a scanty supply of herbage, of an indifferent quality, has long been viewed as a matter of much national importance, particularly since the establishment of the overland routes, requiring mingled mountain and desert service, between the Atlantic States and California or Oregon. Several dromedaries and camels have been introduced from time to time for the object in view; but owing to the want of a proper knowledge of the habits and management of the animals, the attempt has generally proved unsuccessful. Thus, camels were brought from Guinea to Virginia, in 1701, and the enterprise failed. In numerous instances, dromedaries have been introduced into the West Indies and various parts of South America, and have been employed with partial success on the scorching plains, difficult to be crossed by means of any other animal.

At the last session of Congress, a bill was offered and discussed for an appropriation for the accomplishment of the object in question, and it is hoped that further action in the matter will sooner or later take place. Here we would simply remark, that, from the nature of the country, and the necessity of communicating with Oregon and California by beasts of burden, the demands for camels would be increased rather than diminished by the construction of any possible railroad to the Pacific.

The following comments upon the habits, management, diseases, and peculiarities of the camel and dromedary, are principally condensed from a manuscript by General Harlan, of Cochransville, Chester county, Pennsylvania, who resided nineteen years in the East, during a part of which period he was actively involved in the military operations of Dost Mahomed, Amur of Cabul, and Rungeet Sing, Prince of Punjaub, prior to the conquest of Cabul by the British. As general of the staff of the former, he commanded a division of the army of Cabul, destined to the invasion of Bulkh, a part of ancient Bactria. On this expedition he was accompanied by a caravan of sixteen hundred camels, of northern stock, in addition to four hundred attached to his own command. Being compelled to cross the highest range of the Indian Caucasus, and to superintend his own commissariat, he enjoyed the most ample opportunity for becoming practically familiar with the capacities of the northern or Bactrian camel, as he had been previously with those of the dromedary of the plains. He was also able to estimate the relative

value of the cross resulting from their admixture, and known as the "Booghdee" by the Affghans and other northern tribes.

Of the dromedary of the plains, *(Camelus dromedarius,)* General Harlan remarks, that, when selected for burden, he is loaded with ease and safety, and will carry, on an average, four hundred pounds in a level country. On long journeys his daily march is about eighteen miles, and his rate about two and a half miles per hour. The more delicate-blooded and highly trained animals bear much the same relation to their laboring compeers that the racer holds to the dray-horse. They are used exclusively by couriers and express-riders. Their ordinary day's journey is sixty miles; but a fine specimen will travel one hundred miles daily, for several days in succession. His utmost speed is about ten miles an hour.*

The dromedary has seven callosities, upon which he throws the weight of his body, both in kneeling down and rising up. There is one on the breast, two on each of the fore-legs, and one on each of the hind-legs. He sleeps always with his knees bent under his body, with his breast upon the ground, and kneels to receive his load, resting meanwhile on these callosities, which protect the skin from injury by his weight. In the whole structure of this "ship of the desert," there is a most especial adaptation to its arid region, and to those services which man there requires of it, and without which the intercourse of mankind in the East would have been confined to small spots where abundance reigned. The commodities of one part of Asia could not have been exchanged for those of another; commerce, the great moving principle in the extension of civilization, would have been unknown; and knowledge would have been limited to particular districts, and would there have been of the most stunted and feeble growth. The camel's feet are formed to tread lightly on a dry and shifting soil. Its nostrils have the capacity of closing to exclude the sand when the whirlwind scatters it over the desert. Unlike the "iron camel" of America, it is provided with a peculiar apparatus for retaining water in its stomach, so that it can march from well to well without great inconvenience, although they be some hundred miles apart, while its steam-breathed rival refuses to labor without a half hour's draught. Patient under his duties, he kneels at the command of his driver, and rises cheerfully with his load. He requires no whip nor spur during his monotonous march, but when fatigued his driver sings him some cheering snatch of his Arabian melodies, and the creature, evidently delighted with the musical sounds, toils forward, with a brisker step, till the hour of rest arrives, when he again kneels to be disburdened for a little while; and if the stock of food be not exhausted, he is further rewarded with a few mouthfuls of the barley-cake which he carries for the sustenance of his master and himself.

The dromedary of the plains is very ill-adapted to mountain travel-

* The Asiatics and Africans do not apply the term *dromedary* to all of this species, but merely to a light and very swift breed of it, and which is used for riding. As a dromedary, or swift camel, may be of either of the two species, the practice of compilers always calling the one-humped camel the dromedary, creates confusion, especially in reading travels where the word is discriminately used. The Hebrews call the camel *gamal;* the Arabs, *djemal;* but a swift camel, or dromedary, they call *el herie.*—D. J. B.

ling, having but feeble power in climbing, and still less in descending a steep. His chief usefulness is confined to sandy soils; for, when the ground is wet and slippery, as it is usually in clay ground, his hind-feet are exceedingly apt to slide apart and rupture or sprain the ligaments of the pubis, the thighs being very deficient in adductive power, and the legs being very long. This accident is usually fatal; and if it occurs on a journey, the animal is generally killed or left to starve. As a preventive, the hind-legs are hoppled above the gamble-joint, by means of a cord, when travelling over treacherous ground. When thrown down or swamped in mire, the dromedary makes no attempt to rise. The elephant or the horse will roll upon the side on such occasions, and will await or assist the efforts made to relieve him, but the dromedary resigns himself to despair. He is a very noisy creature, and is constantly roaring and braying while being handled and loaded by his driver. Indeed, the slightest disturbance calls forth his obstreperous lamentations.

The Bactrian camel (*Camelus bactrianus*) is a stouter-limbed, heavier-bodied, and much more bulky animal than the dromedary of the plains. He might be useful as a beast of burden, but for the great size of his two humps, and their peculiar position, which render it impossible to adapt such a saddle to his irregular back as would accommodate a respectable load, for much weight upon the back between the humps is inadmissible. The hump in all the camel family is intolerant of pressure, and their burdens are borne upon the shoulders and hips—chiefly the former. This species is, therefore, seldom used, even for light carriage, yet is invaluable as the parent of a hybrid race, formed by crossing the male Bactrian camel with the female dromedary of the plains. This is the "Booghdee" of which we have already spoken. Consequently, the blood of the Bactrian camel is extensively diffused among the dromedaries of the mountains and plains of Central Asia, Syria, and Egypt.

The Booghdee, or cross just mentioned, bears much resemblance to the male parent in general figure, being short-limbed, heavy-bodied, and possessed of great muscular power; but he inherits from his mother the peculiarity of the single hump, and becomes merged into a dromedary. He is not employed by couriers, or express-riders, his speed not being remarkably great.

The average load for a Booghdee, is 600 pounds when traversing plains, and 400 pounds on ordinary mountain roads. His greatest advantage over the ordinary dromedaries, as a mountain carrier, arises from the strength and complete development of the claw which forms the termination of each toe in the camel tribe. In this particular the animal follows his paternal parent; for this appendage is feeble and short in the dromedary of the plains, rendering him less secure in treading among rocks and on wet ground. Moreover, the strength and length of the claw decline rapidly in the mixed race, as the blood of the Bactrian camel becomes less dominant in the progeny. In the true Booghdee it is so strong, that he is nearly as sure-footed as the horse. The comparative shortness of his hinder extremities, also, secures him from disablement by the sliding apart of the thighs; and, being bred among the mountains of the north, his constitution is adapted to colder regions, without unfitting him for labor under the burning sun of the

plains. He is a much quieter animal than the Indian dromedary, and makes scarcely any noise on the march.

The very difficult incursion to Bulkh, 360 miles distant, over the snow-clad summits of the Indian Caucasus, and the return thence to Cabul, in the winter season, was accomplished by General Harlan with the loss of but one camel, and even that one was killed by an accident unconnected with disease or fatigue, though the campaign lasted seven months. His animals were all of the northern varieties, chiefly Booghdees. On the other hand, the British army of the Indus, on its march to Cabul, under Lord Keen, in 1838 and 1839, employed exclusively the dromedaries of the plains of Industan. On the return of General Harlan to India, over the route of one division of this army, he found the line of march literally strewn with the bleaching bones of this unfortunate train; and he learned, from the verbal report of the British fiscal agent at Calmul, that in the other division, accompanied by 35,000 camels, "the result was still more disastrous."

It is obvious, then, that the dromedary of the plains is the proper animal for express-riding on the sands or saline dust of the Great basin, and perhaps in some parts of Middle California; but that he would be useless for all other purposes, except for breeding in the prairie and other regions of the West, where not only arid deserts, but also snow-clad mountains, require to be traversed. The introduction and rearing of the Booghdee should be regarded as the great national object, the importation of the Bactrian camel and the dromedary of the plains being incidentally necessary for the production and preservation of that invaluable race.

All who are acquainted with the history of the improvement of animals by crossing breeds, are aware of the impossibility of preserving the value of mixed stock when the parents differ widely in character, if the plan of breeding "in and in" be pursued. In order, then, to effect the successful domestication of the Booghdee, or mountain dromedary, with us, it will be requisite to supply ourselves with several pairs of the dromedary of the plains for the sake of a supply of females, and a like number of Bactrian camels for the sake of males, although the female of neither race is of much value for burden. It would be likewise desirable to secure a few high-blooded courier dromedaries for the purposes of speed alone.

No sufficient supply of either tribe of camels, except the dromedary of the plains, can be obtained in Lower India; and better specimens even of this class—better, because stronger and more capable of endurance—can be procured nearer home, in the neighborhood of the Mediterranean, especially in Arabia. The Bactrian camel, of the best quality, can only be found in Central Asia, in countries where no one—unfamiliar with the East—dare venture to go, and where even such an adept should be armed with all the means of protection obtainable from the Russian and Persian courts.

It appears probable, then, that Smyrna would be the proper port for the shipment of the necessary supply of these animals. But, in any case, whoever may be employed to carry out the design, he will find his exertions of little avail, unless he is thoroughly acquainted not only with the habits and qualities of the several varieties, but also with the

language and social condition of the people and modes of dealing in those demi-savage regions where his mission must be performed; for no dependence whatever could be placed in local agents. Experiments upon the introduction of animals foreign to the country and climate are extremely liable to failure, in the first instance, from the difficulty of finding agents who are fully acquainted with the economy, habits, diseases, and wants of living beings originally formed by Providence to inhabit another hemisphere; and discouragement from this cause may well prevent the success of the enterprise under notice, unless government is able to secure the advice and assistance of some one thoroughly acquainted with the climates of Northern India and the United States, and also with the varieties, the mode of breeding, and the physical management of camels and dromedaries.

From what has been stated above in this connection, it will be perceived that the capacity for labor of the Booghdee or Bactrian dromedary approximates to three times that of the horse, when loaded upon the back. For draught he is of little use, though sometimes employed in Asia for the light ploughing, or rather scratching of the earth in vogue there, as well as for some other similar duties. In soft sands, or on river mud, he is much less liable to sink or become mired, in consequence of the great size and compressibility of the spongy ball beneath the foot. In this respect he has the advantage of even the dromedary of the plains, because his greater bulk and weight are compensated by at least a proportional enlargement of all parts of his extremities.

The Booghdee wades in safety, streams deep enough to reach the belly; but when the bottom is treacherous, or the water deeper, a boat is necessary for his transportation, as he is no swimmer. The greatest drawback to his usefulness, is his liability to become jammed in descending long and rapid declivities. This species of lameness results from the continued pressure of the weight of the animal and the load upon the shoulders; but it is a curious fact in his economy, that the consequent weakness may be invariably removed in a few hours, by administering, by the mouth, about two pounds of *gour*, a kind of inspissated molasses; this quantity being about equivalent to half a gallon of the ordinary article, of which the animal is very fond.

The Booghdee is ready for full service when four years old, and is considered old at twelve years of age. In comparing him with the horse, as to relative value, it is proper to observe that he is more subject to disease, though, in this respect, he has vastly the advantage of the dromedary of the plains, which frequently die in great numbers, without apparent cause, especially during the rainy season. One form of fatal affection in all the camel tribe is a species of epilepsy, or other convulsion, which frequently occurs during the rains. Through confinement, inattention, and want of cleanliness in their treatment, these animals become liable to a peculiar mange when preparing to shed their coats; and this complaint, when neglected, often produces death.

The female camel goes with young between eleven and twelve months, bearing only one foal at a birth.

The original price of beasts of burden is a matter of secondary consideration in calculations of economy, when compared with their maintenance; nor is of much more moment in comparison with the expense

of introducing animals from distant countries. But, as the prices of camels and dromedaries in the East may excite some interest in those who contemplate their introduction, it may not be amiss to mention that a good Bactrian camel is worth, in Central Asia, about $50; a dromedary of the plains, adapted to breeding, for the purpose of increasing the stock of Booghdees, may be had in India at an average price of $30, but would probably be found much dearer in Syria; and the value of superior courier dromedaries in Beloochistan, the centre of their excellence, varies from $125 to $350, according to the perfection of their points. A Booghdee of superior quality is worth at least $50 on the borders of Persia. I speak here of the males only; for the females, of all the varieties, are worth less than half these prices, though capable of bearing about half a load when not engaged in the care of their young.

In food, these animals are almost as omnivorous as the goat. The interior of their lips and mouth is studded with very numerous, long, and hard spicula, pointing backward toward the throat, and retaining the masses of tough and coarse herbage which they masticate with avidity, and, indeed, with a voracity almost insatiable. These spines, with the lining membrane which covers them, are so callous that they bid defiance even to stout woody thorns. The camel or dromedary will sieze a strong branch of the acacia tree in its large mouth, pressing it back nearly to the commissure of the lips, and then dragging it between the teeth, to the very tip of the last twig, he will appropriate all the leaves, in spite of the acute prickles for which the tree is remarkable. He is fond of the saline or alkaline vegetables of deserts, and especially so of the wild sage. There is probably no plant in the Great basin, or about its margin, that would not be received by him as a luxury. He is such a gormandizer in browsing that he often surcharges himself, and disturbed digestion then renders his breath exceedingly offensive. The ordinary food of these animals, therefore, costs almost nothing, and may be obtained most cheaply, or even gratuitously, precisely in places where that of the horse is most expensive. On long and rapid journeys, the Europeans in Asia give their camels grain, but the natives are not in that habit, except when nothing but dry fodder is accessible, as in the winter season at the north; and it is the opinion of General Harlan that they thrive better without it, when green food can be obtained in sufficient quantity. Quantity, rather than highly nutritive properties, seems to be the chief requisite in the diet of these creatures. When grain is given, it is usual to provide them with two messes daily, and the animals are allowed plenty of time for browsing in the afternoon; but in forced marches, which are sometimes extended to thirty miles in a day, though the rapidity of the gait is never increased, the fodder is brought to them at a later hour. It is proper also to remark, that the animals should not be disturbed after their principal meal until the process of digestion is completed, and the time of this accomplishment may be ascertained by the grating of their teeth at the appropriate moment. This sound is called by their drivers "naish zudden," and until it is heard they pertinaciously refuse to move with their charge; experience having taught them that the precaution is necessary to the

health of their quadruped friends, for whom they entertain a strong brotherly regard.

The quantity of grain for a mess (if any be given) during a march is five pounds in the morning; and it is repeated in the evening, with the addition of ten pounds of dry fodder. When on a halt, the fodder also is divided between the messes. In warm climates it is customary to commence the march about daylight; and when circumstances do not require great haste, the animals are generally turned out to browse at the end of the day's journey—usually about noon—by which means the evening supply of grain is saved.

Of course, these remarks do not apply to the courier dromedary when travelling at speed. His food, on such occasions, should be, if possible, about eight pounds of unbolted flour, and two pounds of *gour*, or a quart of molasses, at each feed, with dry fodder at night. A considerable amount of *ghee* (an oil of butter) is given to these rapid pacers, as it generally improves their wind. In this country lard, or any good animal oil, might probably be substituted with advantage.

With regard to water, the camel requires it but once each day for comfort, but should be permitted to drink it at will, whenever it is accessible. The Syrian stock is accustomed to the bitter water of deserts, and their progeny also should be reared in the midst of such difficulties as they will be expected to contend with in after life. Their singular power of resisting the consequences of the abstraction of water may be improved to a great extent by training and be brought to a degree of perfection probably sufficient for the longest necessary journey through the wilderness of Western America, without wasting power by carrying a supply of an article so ponderous.

One of the great advantages of rearing the Booghdee and the Bactrian camel in this country would be found in the value of the long wool of the head, neck, breast, hump, and shoulders, forming a fleece probably quite equal to that of four sheep, which is annually shorn, and employed in forming tissues, approaching in softness the wool of Thibet, and surpassing in silky smoothness and fineness the most delicate flannel. The proceeds of this article alone would nearly or quite repay the cost of maintaining the animal, especially in the far West. As the saddle for the Booghdee is always so constructed as to avoid pressure on the hump, this wool is not destroyed by its attrition when the animal is on duty. The reason why this very valuable pile has not heretofore attracted the attention of European and American manufacturers may be inferred from the fact that little is known here of any animal of the camel family, except the dromedary of the plains, or Indian dromedary, which does not produce it. The camel's-hair shawl, so called, is not formed of the hair of the camel at all, but, as is well known, it is woven from the pile of the goat of Thibet. Its erroneous title was probably derived from the great reputation of the wool now under notice, which commands a very high price in the East, though of course much inferior in fineness to that of the goat. It is used exclusively in the manufacture of cloths and shawls for the consumption of the nobles.

We offer these somewhat extended details to show that the idea of the domestication of the camel tribe in the United States is a subjec

of great importance in various ways, that it is surrounded with difficulties not likely to be foreseen by careless thinkers, and that the failure of the design, through any defect of plan, would be a national misfortune. To import the stock without a proper selection and management of the animals, both before and after their arrival, by committing the affair to some highly intelligent person, already fully acquainted with their habits, wants, and treatment, would be fatal to success. Even the importation of Arabic or Syrian drivers would only increase the expense to a great extent, without furnishing an effective remedy for the evil; for a knowledge of the climate and resources of both East and West is not less necessary than an acquaintance with the languages of both regions, to enable any one to accomplish the object with certainty and despatch. The foregoing facts have been corroborated from frequent conversations with Hon. Caleb Lyon, of Lyonsdale, New York, who passed some time in the East, and had ample opportunities for verifying their truth.

THE STRIPED GOPHER, OR PRAIRIE GROUND SQUIRREL, OF WISCONSIN.

BY P. R. HOY, M. D., OF RACINE.

The striped gopher (*Spermophilus tridecemlincatus* of Mitchell) is a beautiful little animal, about the size of the "chipmuck," (*Tamias tysteri*,) found abundantly throughout most of the ravines and "oak openings" of Wisconsin and Northern Illinois; also in many parts of Iowa. The ears are short and rounded; the tail, slender and hairy, about half the length of the body; the body is of a dark-brown above, longitudinally marked with alternate stripes and rows of spots of a light fawn color, which correspond nearly with the color of the belly and sides. The lighter lines on the upper part may be distinguished by the brown intervals between, which are occupied by the single rows of light spots, which are generally indistinct on the anterior half of the body.

For the last seven or eight years I have made the habits of this interesting little animal a special study. Some years since, a lad announced that he had brought me a pair of striped gophers, two deer-mice, and some two or three meadow-mice, all of which he had in a box together. He had, also, two flying-squirrels, tied up in a sack. On opening the box, to my surprise and the boy's great disappointment, we found no mice. It was impossible for them to have escaped. What had become of them? On a closer examination, we found a part of the skins of the mice. The gophers had dined on them! Here, then, was something new. I then put the gophers and flyings-quirrels into one cage, and in less than two hours I found that they, too, had been massacred and their brains eaten out by the blood-thirsty little gophers. At this discovery, I felt almost inclined to examine their teeth, to assure myself that I had not caught a "weasel asleep." This accidental cir-

cumstance led me with renewed interest to experiment and closely watch the habits of this much abused friend of the agriculturist. This striped Spermophile is decidedly the most carnivorous hibernating rodent of which I have any knowledge. When a squirrel or other small animal is put into a cage with one of these, it will, in a moment, be all animation and activity, darting at the intruder, inflicting a wound and flying back with such rapidity as to leave but little chance for defence. As soon as it has disabled its antagonist, it seizes it by the back of the neck and instantly kills it. During these combats, the gopher utters a low snarling growl, and emits a musteline odor. After killing, they remove the upper part of the skull, suck the blood, and eat out the brains. The carcass is then devoured as occasion requires; but if an abundant supply is at hand, they only eat the brains, resembling in this respect the weasel.

So strong is their appetite for flesh, that the female will kill and eat her own offspring if animal food cannot otherwise be obtained. Such was the case with one I had; although I supplied her bountifully with water and grain, she regularly, every three or four days, took one of her own young out of the nest and sacrificed to her carnivorous appetite.

These animals select dry situations for their burrows, such as a dry knoll, an embankment, or sod fence, in the open prairie or meadow, their favorite haunts. They dislike to be disturbed by the plough, and usually abandon fields that are annually cultivated. Their burrows are shallow and are never extensive. A bucketful of water will generally force them out of their holes, in which manner they are readily destroyed.

Our little animals lay up no winter store of provisions, but retire to their burrows by the first of November, and there remain perfectly torpid (hibernating) until the frost is quite out of the ground in the spring. They bring forth six or eight young at a single litter, about the 1st of June. At birth the young are extremely imperfect, having no hair until twenty days old, and their eyes do not open in less than thirty days after birth. The adult animals utter a shrill chatter when alarmed, and glide through the grass with such celerity as to elude pursuit. They feed upon wheat, rye, oats, barley, and Indian corn, but prefer grasshoppers and mice to either, and they not unfrequently eat snakes and young birds. They never eat any kind of roots, fruits, nor green vegetables; never cut down nor gnaw young trees; in fact, they will not gnaw out of a cage constructed of soft wooden slats. The only injury I know them to do the farmers, is pulling up a little newly planted corn in the spring, and for this one offence they are condemned without mercy, without inquiring whether they do not subserve some useful purpose in the economy of nature which more than compensates for the damage done the corn crop. I am satisfied that when the case of "Benefits *versus* Injuries" is properly investigated, the agricultural interests will promptly decide that the "striped Spermophile" is an advantage to the country, and is deserving of protection rather than destruction from the hands of the farmer. They keep in check the meadow-mice (Arvicola) and other small quadrupeds. Ground squirrels cannot inhabit the same locality. I have one case in point: Mr. Taws, an energetic and intelligent farmer of this county, (Racine,) bid

up a liberal premium for all striped gophers killed on his premises; and so successful were his efforts to exterminate them. that in one or two years not one was to be found on his farm, where they were formerly abundant; but, as the gopher diminished, the meadow-mice increased, and in two or three years he found his farm infested with these to such an extent as to be highly injurious. His stacks of grain and hay were cut and greatly damaged; his fruit-trees girdled and barked; his potatoes eaten in the hill, &c. Mr. Taws was unable to account for the circumstance of his farm being the only one in the neighborhood where the mice were at all troublesome. However, when I acquainted him with the habits of the striped gopher, he was no longer in doubt as to the true cause. He went home and forbid a gopher being killed on his premises, and invited back as friends what he had before persecuted as enemies; and now, on his farm the mice are rapidly diminishing and will soon be harmless.

Would not the striped Spermophile exterminate the (*Geomys bursarium*) Western gopher? This is a question of considerable interest. From what I know of the habits of our animal, I should judge that it would destroy the pouched gopher. Still it may not be so; for their flesh may be so unsavory as not to be tempting, or the Geomys may be "too much game" to be conquered so easily. I now know of no one locality where the two animals abound, yet there may be such west of the Mississippi. If there are no such localities, it would be well worth the trial to introduce the striped Spermophile to exterminate the Geomys.

IMPORTATION OF SKY-LARKS.

BY JOHN GORGAS, OF WILMINGTON, DELAWARE.

I imported last year from Liverpool two lots of sky-larks, both of which arrived in safety and good health. The first lot, twenty in number, arrived on the 20th of February, (1853,) and were kept confined until the 19th of March, when they were liberated. The other lot, twenty-two in number, arrived on the 18th of April, and were set free the next day. The last lot were only twenty-two days from the time they were trapped in England, until they were turned loose in Delaware. The first lot were about a month longer on their passage.

I ordered only such birds as had been reared wild in the nest, as their instinct of self-preservation would not be likely to be so blunted by familiarization as to render them incapable of getting their own living, nor to shun their natural enemies.

I feel a strong hope that the experiment will succeed, as the birds may now be seen (July 24) ascending to the sky, warbling their beautiful melodies as cheerfully as they do in "merry England;" and there is little doubt but they will propagate with us, and be useful in destroying myriads of insects and their larvæ, like many of our native birds. I think the severity of our climate will present no difficulty in their

increase, as they are found all over Europe, from Siberia to Spain. They migrate from the more northerly regions of the Continent before winter, to the lower districts; but only partially so from many places in England and Scotland, where the climate is probably as severe as that of Delaware and many parts of the West.

My importation, consisting of forty-two birds—about an equal number of males and females—cost me, including all expenses, $60.

NOTE.—Mr. Thomas S. Woodcock, of Manchester, in England, liberated a lot of larks, blackbirds, thrushes, and goldfinches, in Greenwood Cemetery, near New York, in the spring of 1853, having brought them to this country the previous fall. Another lot, just imported by Hon. J. H. Peters, of Charleston, South Carolina, was set at liberty in the city of Washington; but the success of these enterprises thus far is unknown. D. J. B.

ON THE IMPORTATION AND PROTECTION OF USEFUL BIRDS.

BY H. L. WOLFORD, OF WOOSTER, WAYNE COUNTY, OHIO.

In addition to the importation and crossing of the best breeds of domestic animals by government, as well as by individual enterprise, I would also introduce and *familiarize* some of those necessary beings in nature's household, "the birds," on account of their usefulness to agriculture, and their faculties of ornamenting and enlivening the mute air and other creations around us.

It is a matter worthy of inquiry, whether any of the feathered tribes are of more injury to agriculture than benefit, notwithstanding some of them are persecuted with great energy, by enumerating only their depredations, but entirely concealing their usefulness. If some of them should even prove to be injurious, so that their extermination ought to be recommended, it cannot be denied that there are numerous others, the increase of which should be fostered and protected as well as new varieties of such imported from abroad.

The only birds, perhaps, generally injurious to agriculture, are the different species of hawks and owls; because they not only commit their depredations on the poultry-yard, but likewise destroy innumerable other birds and their nests, which would otherwise be of great benefit; so that their extermination should be encouraged, notwithstanding they may at the same time be very active consumers of nuisances, such as rats, mice, insects, &c. Nor are those quite so injurious as generally represented—the different species of blackbirds and crows—which should consequently not be condemned with that perseverance as has been done heretofore. If we enumerate their many useful occupations, and balance them against the damages such as the farmer

experiences from them, the result will certainly be in their favor. The chief depredations they commit are on young corn, which they often pull from the ground after planting; and even that they often do with the good intent of devouring worms which they extract with the young plant, as the grains thus extracted are often found lying unharmed close by. The best mode of preventing such depredations is, to pay a boy a small sum per day to watch the cornfields for one or two weeks, which will only amount to a dollar or two for five or twenty acres, and then the farmer will receive the assistance of those useful birds gratis for the balance of the year, as they will protect his premises against other nuisances—as mice, worms, and snails.

Now, if even such birds are of advantage, how much more beneficial must others be which cannot be accused of doing any harm at all; whose sole occupation is to serve as protectors against insects, and who charm nature with their beauty, and entertain us with their melodious notes. How would our horticulturists fare if they had not their assistance to protect their gardens and fruit-trees from the ravages of insects, myriads of which are destroyed daily by a single bird? How much more devastation would be experienced from insects, and how much more would man and beast have to suffer from them, if Providence had not wisely stored nature's household with these varied means to counteract their nefarious ravages and increase. What a blessing, for instance, to man and animals are the swallows. Just look at them: how busily they are engaged from the earliest dawn till late at night around houses and stables; how untiringly they roam over pasture-fields and highways to consume millions of troublesome flies. And, alas, instead of being rewarded with gratitude for these services by apportioning them a house among us, more than one-half of their skilfully constructed nests are destroyed by ruthless boys for mere pastime, or else to exhibit a larger amount of destructive power.

Our fruit-trees and gardens are, in a similar manner, protected by various other birds; so that every noxious insect, from the smallest to the largest, finds an active destroying enemy in one or the other of the feathery tribes. But when we observe the rapid progress with which civilization and agriculture spread over this vast continent, it will be found that the increase of these friends of man cannot keep pace, and many inconveniences from their scarcity must be the result.

In the statistical reports of Europe there is hardly ever such an occurrence mentioned as a failure of crops in consequence of locusts or grasshoppers, the curculio, grub-worm, Hessian fly, or wevil, because their fields and gardens are provided with an adequate amount of birds, which prevent the accumulation of these pests. The greatest want is experienced on our wide-extending prairies and grain-fields, of such birds as keep them clean from insects. Since the wild turkey, the prairie-hen, partridge, and others, have almost been annihilated by the hunter, our fields are nearly destitute of any guard against insects; and it becomes a matter of great importance to substitute others in their place which would be less apt to attract the attention of the sportsman's gun. As such, I would recommend the "sky-lark" of the Old World, which is everywhere highly esteemed, and regarded as one of the most precious luxuries in nature's household, on account of being

the most delightful song-bird that can be found, which enlivens mute nature, from morning till night, with its most charmingly sweet notes.

As the sky-lark confines itself altogether to open fields, and never will even alight on trees or shrubs, its usefulness is entirely concentrated on grain-fields and meadows. Any climate seems to agree with them, as they make the farthest north, as well as the south, their home; and are compelled only by the coldest winters to migrate for one or two months to more temperate districts—similar, in that respect, to our blue-bird. During the colder seasons they live on grass and grass-seeds, but in spring and summer they feed entirely on insects and worms.

The male sky-larks are the most active song-birds known. From morning till night they will surround the ploughman or the reaper, comforting and shortening his weary hours with their musical entertainments. At almost any time in the day they can be seen ascending perpendicularly to the sky, higher and higher, until quite out of sight, cheerfully singing their merry hymns of praise. In this manner they will soar around in the sky for hours at a time, continually warbling their merry songs, until they gradually descend in the same manner to their "sweet home" and family on earth.

What a great addition it would be to our free country, if an importation of these birds could be made, to ornament and enliven our farms and silent prairies, which seem now only to want the merry bustle of these denizens of the air. Millions of these birds are annually caught on the Continent of Europe, and used as a delicacy for the tables of the rich, notwithstanding they weigh only half an ounce when dressed. I have often attended night excursions in Saxony, where hundreds of them were captured with drop-nets in a single night. Would it not be much better if these same birds, which are destined to enrich the tables of European aristocracy, were imported alive to this continent and be set at liberty, to benefit and ornament our common free country, and constitute living monuments to future generations of progressive agriculture and taste? With an expense of a few thousand dollars, enough could be imported, so that several hundred could be distributed to each of the different States, which when set at liberty at suitable places, and at proper times, would easily accommodate themselves to our climate, and sufficiently multiply, in a short time, to spread over our whole domain.

There are quite a number of other birds, the importation and naturalizing of which would be desirable. For instance, the robin redbreast; also the blackcap, the song-thrush, the blackbird, the quail, and many others, all of which live on insects during the summer, and are excellent singing-birds.

The best time for the importation of these birds would be during the months of October and November, because they are at that time prepared for migrating to a warmer climate, and collect in large flocks for the purpose; and because they can be obtained at that time in great numbers by those whose sole occupation is to catch them for market. After they have been kept in large rooms until they gradually get used to confinement, they may be shipped in cages by ocean steamers, and after their arrival, set at liberty in the Southern or mid-

dle States the same fall. Those destined for the Northern States would have to be wintered in large rooms, to be set free early the next spring.

Appropriations for such purposes, in my estimation, should be made by the national government, because States, as well as private individuals, cannot be expected to incur the expenses attending such an enterprise; and it would be doubtful whether these birds would all remain in the places where they might be liberated, as some of them would be likely to migrate to districts more suitable to their habits and increase.

POULTRY AND EGGS.

CONDENSED CORRESPONDENCE.

Statement of JOHN EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

Considerable attention has been given of late to the raising of fine fowls. Several foreign breeds have been imported, a few of which possess real merit. Persons unacquainted with the statistics of the country, have no idea of the immense value of poultry and eggs in the United States. The value of poultry in 1840, was estimated at $12,176,170; and, owing to the introduction of foreign fowls, and the high prices which have been paid for them, together with the actual increase of the common fowls, the value of poultry, at the present time, cannot be far from $20,000,000. In one day, from Cincinnati, Ohio, there were shipped 500 barrels containing 564,000 eggs. It is estimated that the city of New York alone expends yearly $1,500,000 in the purchase of eggs; and at the Astor House, it is said they require a supply of 1,000 eggs a day for five days in the week, and on Saturdays 2,500.

BEES.

It remains an undecided question, so far as we know, whether the common domestic bee is a native of this country or not. The Indians called this insect "the white man's fly," from which it would seem that they were unacquainted with it before the arrival of the Europeans. It may be remarked, however, that wild bees of the same species were common in the woods of Illinois, at the time that country was settled by the English, prior to 1819.

The earliest mention of bees in this country, that we can find, is that of George Pelton, of Virginia, who possessed a good stock in 1648. They are also noticed by Beverley as being common in that colony previous to 1722.

According to Ulloa, bees were carried from Florida to Cuba by the Spaniards in 1764.

The amount of beeswax and myrtleberry wax exported from Savannah, Georgia, in 1755, was 969 pounds; in 1760, 3,910 pounds; in 1770, 4,058 pounds. The amount of beeswax exported from Philadelphia in 1767, was 35 barrels; in 1771, 29,261 pounds.

The quantity and valuation of wax of domestic production, exported from the United States within the last thirty-three years, are indicated by the following table:

Years.	Wax.	Value.	Years.	Wax.	Value.	Years.	Wax.	Value.
	Pounds.	Dollars.		Pounds.	Dollars.		Pounds.	Dollars.
1820–21.....	241,909	85,654	1831–32.....	258,559	62,444	1842–43.....	475,727	137,532
1821–22.....	238,795	93,129	1832–33.....	783,843	178,748	1843–44.....	963,931	278,039
1822–23.....	325,116	112,574	1833–34.....	354,674	86,803	1844–45.....	814,499	234,794
1823–24.....	308,738	107,451	1834–35.....	375,061	93,919	1845–46.....	542,250	162,790
1824–25	219,884	85,592	1835–36.....	311,807	91,676	1846–47.....	627,013	161,527
1825–26.....	473,832	206,001	1836–37.....	311,202	91,168	1847–48.....	529,691	134,577
1826–27.....	386,767	123,351	1837–38.....	211,819	67,181	1848–49.....	538,056	121,720
1827–28.....	486,530	134,886	1838–39.....	236,520	68,961	1849–50.....	514,096	118,055
1828–29.....	532,422	132,939	1839–40	207,623	59,685	1850–51.....	415,923	122,835
1829–30.....	581,201	153,666	1840–41.....	254,088	74,120	1851–52.....	326,368	91,499
1830–31.....	430,929	114,017	1841–42.....	331,856	103,626	1852–53.....	376,693	113,602

According to the census returns of 1840, the amount of wax produced in the Union was 628,303½ pounds; in 1850, beeswax and honey, 14,853,790 pounds.

CONDENSED CORRESPONDENCE.

Statement of MILO WALTON, *of Amity, Aroostook county, Maine.*

When I moved here, some two years since, there was not known to be a swarm of bees in the county; and to my inquiries, why they were not kept by farmers, I was told that it was too cold, and that all the bees which had been brought here had frozen to death. During the first winter of my residence, the mercury in the thermometer ranged very low, and in one instance it was frozen, from which I was led to believe that it was too cold for these insects. However, the following spring I discovered some bees on flowers, which, on tracing to the woods, I found occupied, as a tenement, a large hollow pine tree. In August of that year I cut down the tree and took therefrom several hundred pounds of honey, which, to appearance, had been in that situation six or eight years. This was a convincing argument that all bees did not freeze, if the mercury did.

After taking the honey, I put the bees carefully into a hive, first placing in a few pieces of brood-comb, and then carried them home and put them into a dry dark cellar, providing them with honey suffi-

cient to last them till spring. As soon as the snow was off the ground, I removed them out of doors and found them in good condition, having consumed but a small part of the honey I had left them. I immediately procured a few more swarms, which have prospered beyond my sanguine expectations, paying more than 100 per cent. per annum on the sum invested.

This county is quite new, and the soil fertile in honey-producing plants, especially the red raspberry and the white clover. The latter, I believe, yields the largest amount of honey, of the best quality, of any plant known.

Last spring, when I took my bees from the cellar, I had forty-eight swarms, since which time they have increased to one hundred swarms. During the last summer they have yielded me over 2,000 pounds of excellent honey in boxes, besides leaving a sufficient quantity for the winter support of the bees. At the present time there are about three hundred swarms in this county, including my own.

The kind of hive I prefer, is a box 12 inches square at the base, and 14 inches high, with a glass light in the rear, 10 inches by 12, having a small door to darken the interior when not under observation. Near the top of the hive is a chamber 7 inches deep, in which are placed two small drawers, or boxes, to contain the surplus honey deposited by the bees.

Statement of WILLIAM S. MAYNARD, *of Ann Arbor, Washtenaw county, Michigan.*

Were others as fond of watching the cheerful labor of thousands as myself, far more attention would be paid to raising bees than there is at present in this land of flowers. No care is required but hiving, and destroying the bee-moth, which otherwise is very destructive here. It is necessary to be much with them, so that they may become well acquainted, otherwise their stings will prove troublesome. In taking their honey, I find the use of chloroform beneficial to keep them quiet.

The cost of raising honey, at fair wages, is from 3 to 6 cents a pound. The market price is from 10 to 15 cents.

Statement of J. P. ROUNSVILLE, *of Rounsville, Alleghany county, New York.*

If proper attention is given to these little workers, they are found quite profitable. But, for the want of space, I can give only a few particulars of my experience in this business. The time of the year in which bees most commonly swarm here, is from the middle of June to the 20th of July. If none swarm before the 20th of June, it may be safely calculated that the season will be quite poor for making honey. Occasionally a swarm is cast, which, upon coming out, will lose its queen; and, as a consequence, after remaining unsettled a short time, will be inclined to return to the parent hive. Under such circumstances I frequently remove the old hive, and place an empty one in its stead, and into this they will return without delay. The queen must then be found, if possible, which has probably dropped, on account of weakness, but a few feet from the hive, where she will be surrounded

by a handful of attendants. But if she is not to be found, by setting up among them a piece of brood-comb well stored with larvæ, they will frequently go to work among themselves and form a new queen. If this last attempt fail, they will seek out the old hive, which must not be kept long from its original place, as a good share of workers, being out after honey, upon returning loaded, will not be able to find their home, and will be lost. About the 15th of August, if there are any swarms that do not weigh 25 pounds, exclusive of the hive, they will scarcely be able to winter, and therefore had better be taken up. In the spring, all those which do not weigh over six pounds should be fed.

I have found the most favorable location for the hives to be in an open field, without a house, and the hives placed about two rods apart. For the purpose of breeding bees, the old-fashioned straw hive is as good as any, or those made of thick, rough boards, of a capacity of about a bushel. I never put a new swarm into a hive having old comb in it, although it may be clean.

SILK.

The culture and manufacture of silk in the British North American colonies date back to the first settlement of Virginia. James I, who was anxious to promote this branch of industry, several times urged the "London Company" to encourage the growth of mulberry trees, and addressed a letter to them on the subject in 1622, conveying strict injunctions that they should use every exertion for this purpose, and stimulated the colonists to apply themselves diligently and promptly to the breeding of silkworms and the establishment of silk works, bestowing their labors rather in producing this rich commodity than to the growth of tobacco—an article to which his Majesty had recorded and published his violent aversion. The company, thus incited, showed much zeal in their endeavors to accomplish the King's wishes. A considerable number of mulberry trees were planted; but little silk was produced, owing to difficulties involved by their dissolution soon after. In about the year 1651, the rearing of silkworms again became a subject of interest in Virginia, and premiums were offered for its encouragement; but it does not appear that the business was ever prosecuted to much extent.

The silk culture was introduced into Louisiana, in 1718, by the "Company of the West."

In the infant settlement of Georgia, in 1732, a piece of ground belonging to government was allotted as a nursery plantation for white mulberry trees, and the attention of some of the settlers was soon engaged in rearing silkworms. In 1726, a quantity of raw silk was raised in that colony, which was manufactured into a piece of stuff, and presented to the Queen.

In 1749, an act of Parliament was passed for encouraging the growth of silk in Georgia and Carolina, exempting the producer from the pay-

ment of duties on importation into London. A bounty was also offered for the production of silk, and a man named Ortolengi, from Italy, was employed to instruct the colonists in the Italian mode of management. A few years before the Revolution, considerable quantities of raw material began to be raised, which was said to be equal in some cases to the best Piedmont silk, and worked with less waste than the Chinese article.

In Carolina, the culture was undertaken by the small farmers. In 1766, the House of Assembly of this province voted the sum of £1,000 towards the establishment of a silk filature at Charleston, under the direction of Mr. Gilbert.

In Connecticut, attention was first directed to the rearing of silkworms in 1760. Dr. Aspinwall, of Mansfield, from motives of patriotism, used his best exertions to introduce this important branch of rural economy. He succeeded in forming extensive nurseries of the mulberry at New Haven, Long Island, Pennsylvania, and other places. Half an ounce of mulberry seeds was sent to each parish in the colony, with such directions as his knowledge of the business enabled him to impart. In 1783, the legislature of Connecticut passed an act granting a bounty on mulberry trees and raw silk. It may be here stated, to the honor of Connecticut, that she is the only State in the Union which has continued the business without suspension, and probably has produced more silk, from the time of her commencement up to the year 1830, than all the other States.

In the year 1769, on the recommendation of Dr. Franklin, through the American Philosophical Society, a filature of raw silk was established in Philadelphia by private subscription, and placed under the direction of an intelligent and skilful Frenchman, who, it is said, produced samples of reeled silk not inferior in quality to the best from France and Italy. In 1771, the managers purchased 2,300 pounds of cocoons—all the product of Pennsylvania, New Jersey, and Delaware. The enterprise was interrupted by the Revolution. A similar undertaking was again attempted in Philadelphia in 1830, under the supervision of M. J. D'Homergue, and cocoons were brought in abundance to the establishment from various parts of the country, and so continued for some time afterwards; but, for want of capital, the enterprise failed.

A manufacture for making bolting-cloth of Georgia silk was established at Wilmington, in Delaware, prior to 1796. In about the year 1831, the project of rearing silkworms, and establishing filatures of silk, was renewed in various parts of the Union; and the subject was deemed to be of so much importance, that it not only attracted the attention of Congress, but afterwards received encouragement from the legislatures of several States, by bounties offered for all the raw silk produced within their limits for certain periods of time. The business soon began to be prosecuted with extreme ardor, and continued for several years, resulting in the establishment of several nurseries of mulberry trees, and ending in the downfall of the famous "Morus Multicaulis speculation," in 1845.

The amount of raw silk exported from Georgia in 1750, was 118 pounds; in 1775, 138 pounds; in 1760, 558 pounds; in 1766, more than 20,000 pounds; in 1770, 290 pounds; from South Carolina, in

1772, 455 pounds. In the year 1765, there were raised on Silk Hope plantation, in South Carolina, 630 pounds of cocoons; in Mansfield, Connecticut, in 1793, 265 pounds of raw silk; in 1827, 2,430 pounds; in 1831, 10,000 pounds; in Connecticut, in 1844, 176,210 pounds; in the United States, the same year, 396,790 pounds.

According to the census returns of 1840, the amount of silk cocoons raised in the United States was 61,552½ pounds; of 1850, silk and silk cocoons 10,843 pounds. From the above, it is obvious that the production of cocoons has decreased, since 1840, 46,789 pounds; and since 1844, 382,027 pounds.

FERTILIZERS.

CONDENSED CORRESPONDENCE

Statement of GEORGE P. FISHER, *of Dover, Kent county, Delaware.*

Our most approved plan of manuring is to cover as much of the corn-field, in the spring, as we can, with barn-yard manure; and then to sow guano, at the rate of 300 pounds to the acre, on the residue of the field, turning it under deep with the plough. If the corn-field is a clover sward it should be turned in the fall and well limed, and the manuring done in the spring as above, except that the spring ploughing should not be more than four inches deep. The wheat field is generally all manured with guano. Bone-dust is used only to a limited extent, in consequence of its great scarcity. Phosphate of lime was used by a few of our farmers last spring for corn, and the result was even better than that obtained from Peruvian guano. Poudrette was tried here several years ago, but totally failed. I tried one experiment, on a small scale, with two barrels; taking a piece of very poor land and manuring it for corn in the hill, with a handful of poudrette, according to the directions. Until the time for making the ear, the effect of the poudrette could be discovered as far as the corn could be seen, but it made no ear at all.

For the benefit of others who might possibly try a similar experiment, I will here give the result of one tried by myself in the year 1850. In the spring of that year, having a poor field of thirty-six acres which I wished to put up very rapidly, I sowed it with oats for turning under with the plough in July, and again in September. A part of the oat crop looked so tempting at harvest, that I cut them and turned in the residue and the stubble of that part I had cut. A very fine crop of green oats came on about the last of September. I then applied six tons of guano on the whole field, and also sowed my seed-wheat, turning it under at one ploughing, together with the guano and the green oats. I expected I should harvest some 600 or 700 bushels; but, to my great surprise and grief, as soon as the wheat came through the ground

it was attacked by myriads of little green lice—almost precisely similar to those which infest the roots of corn sometimes in the spring—and they never left it till that part where the oats had not been cut was entirely destroyed, and there was not a fourth of a crop of wheat on the stubble ground.

Statement of ANTHONY M. HIGGINS, *of St. George's, New Castle county, Delaware.*

In about the year 1830, lime began to be introduced, against much skepticism as to its utility. It is now universally used, and may be regarded by our farmers as the principal element in the success already attained. It is deposited by lime boats, from the Schuylkill, along the banks of the Delaware and other inlets, in vast quantities, at a cost of from 12½ to 14 cents per bushel of stone or quick-lime. No farmer has occasion to haul his lime further than five or six miles from a landing.

Statement of JOHN M. LESLEY, *of Danville, Vermilion county, Illinois.*

There is no guano, lime, nor bone-dust in use here, that I am aware of. In fact there is no manure used but muck and straw, which are spread as evenly as possible on the thin portions of the soil, where, after remaining for a while, they are ploughed under and left to rot. Wherever manure is used freely, the crops produced are in proportion to the amount applied.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

In gardening, when the earth is every year deeply ploughed and frequently stirred and exposed to the rays of the sun and action of the air, the use of well-rotted manure is indispensable to the keeping up of the fertility of the soil. And even in field crops, let the rotation be what it may, where the land is to be ploughed and worked every year, an exhaustion will take place, which can only be supplied by the application of manure; thus, in a rotation of six years, allowing three years to clover and the next three to other crops, our experience goes to establish the fact that, under this system of management, properly and judiciously carried out, the land will improve in its fertility and productiveness.

Statement of WILLIAM UPTON, Jr., *of Dixmont, Penobscot county, Maine.*

But little manure is used here as yet, excepting that of the domestic animals kept on the farm; though plaster, lime, and swamp muck are somewhat used. The latter is applied by many in the natural state, with apparently little benefit resulting, though it is valuable, even in that state, as a manure for potatoes in the hill; indeed, it is almost the only manure that can be safely used for that crop since the rot has prevailed.

Statement of F. C. CLOPPER, *of Woodlands, Middlebrook, Montgomery county, Maryland.*

The article of guano has become indispensably necessary to the production of remunerating crops of wheat and corn on our worn out fields. It is therefore of great importance to us that there should at all times be an ample supply in the market, of the best quality, and at the lowest price at which it can be afforded. Peruvian guano, which is generally preferred, as I understand, is under the sole control of the government of Peru, or her agents, and therefore is no more nor less than an odious monopoly. Governments, like individuals, are prompted to action by motives of interest. Now, it is to the interest of us farmers to procure the article as cheap as we can; but, at the same time, it is of equal importance that it should be pure and unadulterated. In this particular, it strikes me that we are more likely to get it unadulterated under the present system, than if it were open to an indiscriminate scramble at the islands, as it is for the interest of those furnishing the article that its character should be maintained. The slightest deterioration would diminish the demand for it. Yet, at the same time, it is equally evident, that if the government price were reduced from $46 per ton to $35, they could readily dispose of double the quantity that has ever reached our shores in any one season. It is, therefore, worthy of their consideration, whether their interest would not be promoted by such a reduction.

Pure Peruvian guano, at the present price, is cheaper to the farmers, and more desirable in this section of country, than to have an unlimited amount of barn-yard manure placed at their disposal gratuitously, provided they have to transport and apply it at one mile distant; time, labor, and expense of teams, making the difference. Not that I would discourage the use of stable or barn-yard manure, for it is invaluable as a permanent renovator; but the use of guano will furnish the means to increase the quantity, and therefore enhance the value of that article.

Statement of DAVID BRUMBAUGH, *of Marsh Run Mill, Washington county, Maryland.*

The main source of manure in this county is the barn-yard, where the straw, corn-stalks, and refuse of all kinds are collected; but a very great defect is often found in the location of such yards, being on the side of a steep hill, where much of the liquid portion of the manure is entirely washed away and lost.

Guano has been used in small quantities, principally on wheat, and, I think, with good effect. It is rapidly gaining favor with the farmers on what is called "Salisbury Ridge." It has almost a magic influence, increasing the crop two-fold, if not more. Some seasons, on the best land in the county, I do not think the effect so great, as the straw is increased too much for the quantity of the grain.

I have frequently used as a fertilizer on my land what is called "pond mud," being one among the many materials which nature has provided for the use of the husbandman in the labor of permanently enriching his soil. It is found in many localities along running streams.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachusetts.*

The super-phosphate of lime is a new article among our farmers; but an establishment for its manufacture has been got up in our neighborhood the last season; and from the limited experiments made within the short time it has been in market, it promises to rank among the most effectual of fertilizers. For turnips it is highly valuable, sown on when they first come up. It is fatal to all the insect tribes, both above and below ground, which are often so injurious in their ravages on the crop, and gives a cleanly and luxuriant growth, that cannot be realized from any other manure. It is also valuable for all crops on which I have seen its application; but as the supply of it can never be equal to the wants of all, it is best to give it to those which are most benefited by it.

Lime is extremely valuable for lands which have acquired too much acidity, whether they rest on a limestone formation or not. But the extreme high price it bears, from 25 to 30 cents per bushel, forbids the use of it to any considerable extent. The refuse of the kilns is readily bought up at cheap rates, and usually applied to land in compost with swamp or pond muck, or turf from the highway, which, when thoroughly worked, is productive of great benefit as a top-dressing on grass lands, and frequently ploughed crops. The ashes from these kilns, like house ashes, are in high demand for the compost heap, or immediate application to the land, where their effects are strongly marked and long visible. They are obtained at from 8 to 10 cents a bushel.

Gypsum is used in good quantities both on grass and ploughed lands, on such soils as are found adapted to it. On any land that will produce clover or winter grain, its effects are highly beneficial, but greatest when applied with yard or compost manure. It seems desirable to have some decomposable substance to act with it, in order to realize the greatest benefit. Hence the good effect of manure in some form in connexion with it. If sown upon grass lands, it cannot be done too early in the season, provided a calm atmosphere favor the operation. Indeed, I have sown in autumn, in order to realize its effects fully the following year on meadows. On spring grain it should be sown as soon as the first leaf is plainly formed. In the experience of some farmers, if sown and harrowed in with the grain it is most beneficial. So we see that no certain rule can be adopted for its application, and that the observation and judgment of each farmer must direct for his own premises. I have found that where we have manured corn in the hill, a gill of plaster with the manure was worth a third more than when applied after the corn was up, yet the reverse of this might be the case in other experiments. I have also found that a sprinkling of plaster thrown over our manure once a month through the winter, added greatly to the value of the increase, and gave it greater action the following season.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

We have never used manures to any great extent in Missouri, except what is obtained from the barn-yard and stable. The farmers of one

of the best wheat-growing counties of the State are in the habit of raising their grain from the same lands for a series of years, without much depreciation of product, and the manure they apply is the straw that comes from the preceding crop. Clover is the best and most generally used fertilizer among us. It is usually sown in the proportion of from one to two gallons an acre on wheat, or with oats in the spring. It does not succeed well when sown in the fall.

Statement of A. G. COMINGS, *of Mason, Hillsborough county, New Hampshire.*

Guano, super-phosphate of lime, plaster, &c., are having a greatly increased use among our farmers. The beneficial effects following the use of these manures are found to depend upon the manner of their being applied.

In manuring a kitchen garden, three divisions of the ground should be made, as follows: No. 1, should be for onions, carrots, tomatoes, celery, and all plants and vegetables that require much ammonia. An application of guano or hog manure should be made to this division of the ground. More vegetable or carbonaceous matter than guano contains should be applied.

No. 2, besides a supply of old vegetable matter in the soil, should have a mixture of guano and super-phosphate for the production of potatoes, peas, beans, beets, corn, &c.

No. 3, for cabbages, turnips, &c., should have no hog manure nor guano, although a small quantity would do no injury to turnips; but much ammonia in the manure for cabbages and turnips would make them club-rooted. Super-phosphate of lime for this division of the garden will show an effect most highly gratifying, with vegetable matter in sufficient quantity.

The above suggestions on manures for different divisions of a kitchen garden, and the plants to be cultivated in those several divisions, are made from experiments which I have directed and seen. I have embraced in the list of vegetables and plants several which are cultivated as field crops.

I have proved both guano and super-phosphate to be valuable for Indian corn, but find the best effect from mixing them in equal quantities. I have, the past season, applied the mixture to a field of corn, about 100 pounds of each to the acre, with a light dressing of compost, made of vegetable matter with animal excrements, spread and ploughed in. The mixture of guano and super-phosphate was applied in the hill. The effect was decidedly good. I also applied the same mixture to a piece of ground, sowing broadcast and ploughing in, for Tuscarora corn, without any other manure. It appeared very beautiful, and where there was a good supply of old vegetable matter in the soil, it continued exceedingly fine; where there was but little old vegetable matter in the soil, it failed to fill the kernel well. I selected another piece of ground for the super-phosphate alone, where the soil was in good condition in every other respect than being nearly destitute of old vegetable matter. The color of the corn while growing was healthy in appearance, and there was a fair growth of stalks, but not enough corn

to be worth the harvesting. Not a single well-formed ear could I find in the field. This was as I anticipated. There must be, I think, a full supply of carbonaceous food for every plant to mature its seed. Super-phosphate alone will not produce corn where there is little or no vegetable matter in the soil.

I also applied super-phosphate to a field where I planted corn for fodder. One row was left without any. The ground had been lightly manured with compost and then ploughed. To ascertain the exact difference caused by it, I cut up thirteen stalks of the fairest in the neglected row, and as many near by them in a row to which the super-phosphate had been applied, and found the difference as thirteen and a half to one, by weight, in favor of the super-phosphate. The difference in height was four to one and a half in favor of it.

In this county, I have known no use to be made of super-phosphate before the past season. It has proved itself a valuable manure; but for plants bearing seed, it is by no means sufficient alone. I have not found it successful by itself except in one case. I had a small spot of ground which was mostly made by throwing out subsoil, so that very little vegetable matter could have been in it. With no other manure, I raised the best Savoy cabbages that I ever saw.

In the use of plaster, our farmers have had but little experience. Most of them who have tried it heretofore, have applied it to corn and potatoes in the hill. The advantage of it when thus used has been very little. When it has been applied to the surface of the ground, especially where manure had been applied which contained much ammonia, its value has been unquestionable.

Salt has for some years been used more or less, by many of our farmers. It has been applied to the potato crop with evident profit. When sown upon the land, as much as six bushels to the acre has been employed; when applied directly in the hill, a smaller quantity. Potatoes have generally been more free from disease where it has been used. It has also been used with good success for other crops, especially cabbages. I have sown it broadcast among grain. About one and a half or two bushels to the acre on wheat or oats, after they are well up, will, on most soils, produce an excellent effect.

Statement of LEVI BARTLETT, *of Warner, Merrimack county, New Hampshire.*

Manures made from the farm stock are most in use with us. But many of our enterprising farmers have recently been adding much to the improvement of their soils, and increase of crops, by composting animal manures with swamp or pond muck. Guano, bone-dust, and other similar fertilizers, have not been used here to any great extent. Gypsum is freely used—sometimes with very good results; at others, it has no visible effect.

I will relate an experiment I made in the use of guano, and the fine bone-dust from a button factory, in growing potatoes, several years since. The soil upon which the potatoes were planted (one and a half acres) was mostly a light sandy loam, which had long been pastured with cows—perhaps fifty years. I began planting upon one end

of the field, and dropped a teaspoonful of guano in each hill of ten rows, then left several rows without manuring; next ten rows received a tablespoonful of bone-dust in each hill; other rows were again left unmanured; thus alternating, until the field was planted. In a few days after, the tops appeared; the dark-green, broad leaves told plainly where the guano and bone-dust had been applied to the hills, and the difference was very apparent all through the season. At the time of harvesting, it was found that the crop where the guano and bone-dust had been used, was just double that of the unmanured rows; and it took no longer to dig a bushel from the manured, than it did to dig half a bushel from the unmanured hills.

Theory would account for the favorable action of the guano and bone-dust, upon the supposition, that from the long time the land had been grazed by milch cows, it had become deficient in phosphate of lime and ammonia; and that these important ingredients were supplied by the guano and bone-dust, in a concentrated and available form for the crop. The practical result in this case would seem to sustain theory.

Early in September, I sowed a field with winter-wheat, upon which I applied per acre at the rate of 300 pounds of Peruvian guano. The wheat now (October 25th) is looking finely—much better than other fields where no guano was used.

In the season of 1851, I used upon various crops a few hundred pounds of mineral phosphate of lime from New Jersey. When applied in its raw state, it had no perceptible effect. A portion of the mineral treated with sulphuric acid, changing it to the more soluble super-phosphate, had a very marked effect on the cabbage and turnip tribe of plants.

Last spring, I received from Professor Horsford, of Cambridge, Massachusetts, a few pounds of artificially prepared manure, to be applied upon field crops at the rate of 160 pounds per acre—one pound to the square rod. Upon the wheat and oat crop it had a decidedly good effect, increasing the growth of the grain very perceptibly, and hastening the maturity of the crop. I also tried it on various other crops, in proportions according to printed directions accompanying the package. It was used on land planted with turnips, carrots, squashes, potatoes, &c.; but, unfortunately, drought, bugs, grasshoppers, and the carelessness of my hired hand, destroyed all comparative results.

Statement of SAMUEL WEBBER, *of Charlestown, Sullivan county, New Hampshire.*

Stable and barn-yard manure is our great dependence in maintaining our crops. With some, it is composted with muck, and in a few instances, very improperly, with wood-ashes or lime. Gypsum is occasionally employed, and sometimes ashes alone. All admit that barn-yard or stable manure is good, but do not agree as to the best mode of applying it. Some prefer it in a long, or green state; others fermented, or partially decomposed; while a third class use it in a rotten state. Some use gypsum with good effect—others not; and all coincide in the excellence of ashes, when applied to Indian corn.

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

In this cold climate we have to feed our stock during the winter months, and until late in the spring. Horses, cattle, sheep, and hogs are housed and fed. The horses are most carefully stabled, and our cattle, sheep, and hogs afforded an excellent shelter. The hay, straw, and other feed are thus converted into manure, and left in the barn-yards until thoroughly rotted and fit for use. It is then carried and spread upon the land as a fertilizer.

Those farmers who give any attention to the improvement of the soil, increase the amount of manure by having a compost heap, which is made as follows: Draw up swamp muck, put it in a heap, add to it lime, barn-yard manure, and other convenient perishable materials. In a year's time, it is fitted for use, and pays well, affording a large profit on the outlay. Bone-dust and shell-lime are used also as fertilizers, and those who employ them are highly pleased with the results. Lime and plaster are both used as fertilizers—the latter by all. Corn, when planted, is rolled in plaster, and the young plant is covered with it. It is likewise sown on grass and clover fields, with the best effect.

Statement of LUTHER BAILEY, *of the United Society of Shakers, North Union, Cuyahoga county, Ohio.*

Barn-yard or stable manure is the only kind used here. In order to increase the quantity as much as possible, our yards are abundantly supplied with muck and litter, such as straw, saw-dust, turners' shavings, and any rubbish or filth that may accumulate about the premises; also muck from the woods or swamps, the wash from creeks, or anything of like character, are hauled from time to time into the yards. The stables are well supplied with straw, saw-dust, or turners' shavings. This litter, both in the yards and stables, by absorbing the more liquid parts, by retaining and preventing the escape of ammonia, furnishes an abundant supply of rich manure. The best mode of applying it is to spread on the surface and harrow it in. Our experience proves this to be much better than ploughing it under for any crop.

Statement of N. LINTON, *of Cochransville, Chester county, Pennsylvania.*

The manures mostly used here are those of the barn-yard, lime, gypsum, and guano. Barn-yard manure and lime are our main dependence. The former is usually applied to oat-stubble, and sometimes to clover-seed, for wheat. In some instances, also, it is ploughed under for corn. Lime is mostly spread on the sod, at the rate of 30 to 60 bushels to the acre, once in each course of crops; but it is often scattered on corn ground, just previous to planting. Many farmers think it the best way to apply it to wheat-stubble shortly after the grain is harvested: but, in whatever way it is put on, it is the basis of successful husbandry in this vicinity. Nearly all our land for miles around was formerly worn out old fields, which would produce nothing; but the application of lime unlocked the hidden treasures of the soil, and rendered available, as food for plants, the inert organic matter which it

contained. This, accompanied by judicious cultivation, and a proper rotation of crops, has entirely changed the appearance of our neighborhood. Scarcely an old field is now to be found. Guano has been used to some extent of late. It is mostly employed for wheat, and ploughed in at the rate of 300 pounds to the acre. Its effects are generally considered renovating, and its use is greatly extending. Gypsum is applied on the young grass in the spring, when it is just starting. About one bushel to the acre is the quantity usually put on, and its effects are often very good, while at others it is not perceptible.

Statement of M. F. Myers, *of Kingston, Luzerne county, Pennsylvania.*

We use mostly stable manure, together with turning under clover as a renovator. Lime and coal-ashes are used to some extent, and with good results, on clayey soil. I will here give you my experience with lime on a heavy, clayey loam. I applied 100 bushels to the acre on a corn-stubble, and planted again in corn, but saw very little benefit to the crop. I then ploughed and sowed with oats, in 1851, together with clover and Timothy. For the two past seasons, I have mowed the finest of grass. One year ago, I top-dressed part of my meadow with 100 bushels of lime to the acre, with like results. The coal-ashes were managed in the same way, and with the same success.

Statement of Joshua S. Keller, *of Orwigsburgh, Schuylkill county, Pennsylvania.*

As fertilizers, we chiefly use barn-yard manure. Guano and other concentrated fertilizers are used to a limited extent. I have made use of guano on corn and turnips; in the former crop it did not pay, but in the latter it was attended with good results. As to the mode of application, I hold that all manures ought to be covered from two to four inches deep, if every possible benefit is to be obtained from them.

The cheapest way to improve land in this and the adjoining counties is by lime. It is not considered as a direct fertilizer to our grain crops, except in a small degree in furnishing food to the plants, but as a kind of stimulant or decomposer to the almost exhausted organic remains, as well as some animal matter, the effect of which creates a nourishment favorable to grass; and fine clover is thus produced, which, after growing up for a few years, ought to be turned under when fully ripe, with a good plough. Let those who advocate the green state do so to their hearts' content; I have the experience of both the dead-ripe and the young-green, and would by no means suffer the latter if I could prevent it. The best way to apply lime is on the top of a sod, one or more years before it is ploughed under. The quantity depends on the kind of soil and after-treatment. Heavy clay can bear 100 or more bushels to the acre, while on light soils from 50 to 80 bushels will answer very well.

Statement of JOHN EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

The only fertilizers in general use with us are lime, plaster, or gypsum, and barn-yard manure. Air-slacked lime and barn-yard manure are applied to land intended for wheat, oats, or corn, and are generally, though improperly, spread upon the ground after it has been ploughed. Plaster is principally used in the spring on our grass lands, at the rate of a bushel to an acre, which will increase the yield of hay about one third. Fifty bushels of lime and twenty-four horse-loads of barn-yard manure to an acre, renewed every three years, are generally applied for corn, oats, and wheat, which usually increases the yield 25 per cent., and the soil will be in good condition for the two following crops.

Statement of STEPHEN H. SMITH, *of Lonsdale, Providence county, Rhode Island.*

In all my applications of guano to grain crops, it has proved a valuable manure. Ten dollars' worth of Peruvian guano to the acre, well applied, will give an increase of 20 bushels of corn, or 12 bushels of rye. I apply it pulverized and mixed with soil, sowing it broadcast, on a deep furrow, and harrow it in. On a field that is ploughed deep, I apply it by ploughing it under three or four inches deep. It is preferable to use it very early in the spring, before the rainy season is past. If left until May or June, it will not diffuse its fertilizing properties through the soil. A portion will be lost from concentration, while another part will be evaporated by the summer's heat.

I have had the best success when the guano was made on winter rye, sown early in September, and stocked down to grass at the same time. A field of twenty-four acres, from which 300 bushels of spring rye had been taken the season before, was sown about the 1st of September with 10 pounds of clover, one peck of Rhode Island red-top, (herdsgrass of the Middle States,) one peck of Timothy seed, five pecks of winter rye, and 400 pounds of guano. The result was, that the field produced 600 bushels of rye, worth 90 cents per bushel; 15 tons of straw, worth $10 a ton; and a large amount of pasturage besides.

Statement of JOSEPH PARKER, *of West Rupert, Bennington county, Vermont.*

Guano, super-phosphate of lime, gypsum, and wood-ashes, are the principal fertilizers used in this vicinity. With the exception of barn-yard manure, gypsum is the chief foreign substance used, though guano has been tried on corn with good success. Last season I tried super-phosphate on corn, by applying it to the hills previous to hoeing; and in order to test it more thoroughly, I applied it to a few rows after hoeing, but with no perceptible difference in its effects. The difference in the portion of the field to which super-phosphate had been applied could be distinctly seen at a distance, and the yield at harvest was often one fourth to a third more than the part to which no super-phosphate had been applied.

I also applied some super-phosphate to an old meadow near the commencement of a drought, but I could not perceive any difference in the overgrowth of the grass where it had been applied.

Statement of Joseph Bowditch, *of Fairfield, Franklin county, Vermont.*

Our principal supply of manure is from the barn-yard. Gypsum is extensively used—guano but little. Barn-yard manure is carefully saved, and applied to a considerable extent as a top-dressing to our grass lands. Some draw it out directly from the stables in the winter season; others haul it as it thaws in the spring; but our best farmers keep it under cover until late in the fall, and then spread it over their meadows. In so doing, the grass starts early in the spring, before the scorching rays of the sun in June have robbed the manure of its ammonia. There is not that attention paid to compost heaps there should be. We apply from 5 to 100 pounds of plaster per acre.

IMPROVEMENT OF LAND.

CONDENSED CORRESPONDENCE.

Statement of Simon T. Asheton *and* Elijah Myrick, *Trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

Our meadows, previous to improving, had been cropped of their natural grasses for fifty years, until they were no longer worth cutting, when they were left to grow up to bushes three feet high, and with moss and bogs. First we commenced by ditching six feet wide to the bottom of the peat, as near each other as necessary to perfect a draining. The bushes were then mowed, the bogs cut up and burnt, and the ground turned over with a meadow plough in the fall. They were then planted similar to our usual rotation of crops, sometimes omitting corn.

In September, 1852, we ploughed four acres of meadow similar to those described, which was left for the action of the frosts. Owing to the abundance of rain that fell in the spring, it was difficult to get a team on it until quite late in the season. It was the first week in June when we commenced ploughing. On the 10th the rains came on again, and it was difficult to draw over muck for manure. We succeeded however, in getting on ten loads per acre, which was put in the hill on planting our potatoes, and well covered in the usual way. Drought immediately followed the rains, and the potatoes did not make much growth until the first of August, when they commenced growing rapidly. They were dug about the middle of September, the field having been left to its fate from the day it was planted until harvesting had begun; not one hour's labor having been expended upon it with hoe or other implement. The field yielded 800

bushels of as fine potatoes as any one could wish, and is now in good order for any other crop suitable for a peaty soil.

The whole expense of ditching, manuring, and planting, $15 per acre. Price of potatoes in Boston market, 50 cents per bushel. Cost of transportation by railroad, 12½ cents per bushel.

Three years ago we commenced a new plan of reclaiming meadows. First we mowed the bushes close to the ground, bogs and all, leaving the surface clean and smooth, and then burnt over the ground, which made an excellent manure. We next carted on about fifty loads of clayey loam, and harrowed it with a light harrow to mix the soils. Then three pecks of herdsgrass (Timothy) and red-top seeds were sown, which came up the following spring, and the yield was one ton of excellent hay. This season it was estimated, by competent judges, that there were 2½ tons of hay on that same acre.

Price of hay, $16 per ton. Cost of clearing, $5. Cost of carting, $10. This experiment exceeded our expectations, and we are about to prepare fifteen acres more in the same manner. Clay proves better on our meadows than any kind of earth we have ever tried.

Statement of HENRY F. FRENCH, *of Exeter, Rockingham county, New Hampshire.*

To show that reclaiming swamp lands for grass, if properly done, will pay, I send a condensed statement of my operations on a meadow in Exeter. The price paid for it was generally thought, at the time, to be very high, and probably no looker-on while my work proceeded, ever believed that it was other than a waste of money. I consulted a gentleman who had had charge of the land several years, and he said it had been examined by the best farmers, who had agreed that the most of it was entirely worthless, and could never be made productive. On the very part pronounced the worst, I have cut 3⅓ tons of hay to the acre at one cutting. The account shows that my expenditures, and the interest on the cost, have exceeded $800 since I bought it, in 1844; and yet, that at the lowest price for hay, the lot has repaid it all, and much more. The soil is part a clayey loam, and part black mud upon sand. My account was kept very exactly, for my private use. The hope that farmers may be induced to keep such accounts, and that their faith in the gratitude of mother earth to her sons for their attention to her may be increased, has induced me to publish it. I do not regard the work as very well done, and I know that 20 tons of hay might have been profitably raised, instead of 15, upon the lot, had I treated the whole as I treated part. I have sold most of the hay yearly, so that the weight was ascertained, and not merely estimated.

DR.—*The Court-house Meadow.*

1844.				
May.	To purchase-money for seven acres			$639 00
	ploughing, &c., for potatoes, 97 rods	$9 14		
	12 bushels of seed potatoes	3 00		
	11 loads of manure, and hauling	26 98		
	ditching	5 00		
	breaking up one acre, six yoke of oxen	14 50		
				58 62
Nov.	To six months' interest on cost			19 17

1845.	To 5 casks of lime	$5 45	
	ploughing and cultivation of oats and potatoes	27 93	
	seed potatoes	1 80	
	making roads and planting potatoes	11 58	
	fencing	35 15	
	15 loads of manure	30 00	
	labor of men and oxen, ploughing, digging stumps, ditching, levelling, spreading manure, and digging potatoes	79 30	
	grass-seed	2 25	
			$193 46
	interest on balance of last year		39 00
1846.	To grass-seed	2 27	
	1 barrel of guano	5 60	
	stable manure, hauling and composting	24 42	
	labor of men and oxen, ploughing and laying land to grass	14 70	
			46 99
	interest on balance of last year		47 90
1847.	To manure, and hauling and composting	32 50	
	labor of men and cattle, clearing up the last piece	52 50	
	ditching, &c.	8 00	
	grass-seed and rye	3 75	
			96 75
	interest on balance of last year		47 00
1848.	To labor		10 00
	interest on balance of last year		49 69
1849.	To interest on balance of last year		46 97
1850.	To interest on balance of last year		43 69
1851.	To ploughing and laying one acre to grass, and manure		25 00
	interest on balance of last year		40 70
1852.	To 7 loads stable manure, hauling, composting, and spreading, for top dressing		19 25
	interest on balance of last year		20 34
1853.	To interest on balance of last year		16 71
			1,460 24

Cr.—*The Court-house Meadow.*

1844.	By 6 tons good hay, standing	$32 00	
	meadow grass and second crop	6 00	
	81 bushels potatoes	16 20	
			$54 20
1845.	By 7 tons of hay, standing	56 00	
	25 bushels of oats	10 00	
	3 bushels of barley	2 50	
	50 bushels potatoes	15 00	
	wood	1 00	
			84 50
1846.	By 10 tons of hay, standing	90 00	
	40 bushels potatoes, (on shares)	20 00	
			110 00
1847.	By 12½ tons of hay, standing	95 00	
	8 loads mud hauled	4 00	
			99 00
1848.	By 15 tons of hay, standing	100 00	
	5 bushels of rye	5 00	
			105 00
1849.	By 15 tons of hay, standing		105 00
1850.	By 15 tons of hay, standing		90 00
1851.	By 12 tons, (one acre sold off)		75 00
1852.	By 9 tons hay, standing		100 00
1853.	By 9½ tons hay, standing		133 00
	Balance, being the present cost of the lot, after paying all expenses, and 6 per cent. interest, to November, 1853		504 54
			1,460 24

The result of the operation, *agriculturally* speaking, is that the lot has paid all expenses of labor, fencing, and manure, 6 per cent. interest annually, and $134 46 more. But this is not all. More than half the lot was, when purchased, a worthless swamp, part filled with hassocks, so that six yoke of oxen were required to plough it, and part covered with stumps, from which the wood had been recently cut. Now, the whole is a clean, level, mowing-field, free from all obstructions except a few open ditches.

I think the fair value of such land is about $200 an acre, near any good market; and to show that my opinion is not singular, it may be stated, that I have sold enough of the lot, since last haying time, at $166 75 per acre, to bring me $565. It adjoins no street, and was purchased merely for agricultural purposes, and was subject to an incumbrance, for which I had received $100. I also, in 1851, sold a little more than one acre for $ 40, a part of which perhaps was for fancy, though it is occupied only for farming.

Farmers can make money by reclaiming wet meadows, and the foregoing statement shows it. This land was no better than thousands of acres which may be bought in New England at $10 an acre; yet I paid for it nearly $100, because it joined my garden where I then lived, and, like all land-owners, I like to buy all that joins my own. Farmers can attend to such work at times of leisure for themselves and their cattle. I paid $1 per day for every day's work of a man or yoke of oxen. The account will show that the hay, which was of the first quality of herds-grass, was estimated at only from $6 to $8 per ton until 1852, when it is set down at about $9. This is a lower price, by far, than the average in our region in past years, prior to 1844. This year I sold it from the field at $16. Again: every cord of manure is charged at $4, whether purchased or hauled from my own barn, and this is twice the cost of making it in most localities. Then, as usual, I followed no beaten path, but tried all sorts of scientific experiments in a small way, with lime and guano, and with barley, rye, and oats, on places where it was said they would not grow. Everybody knows that these experiments are expensive to him who tries them, however they may help the cause. Indeed, I flatter myself that, with the added experience of ten years, I can manage wild lands to much better advantage than this lot was managed. I sold a part, because my home is now on a new farm, where I am indulging my propensity to make rough places smooth, on land which cost me but $25 an acre; so that my interest account will not consume the profits.

The three acres which I still hold of the "Court-house Meadow," are worth more per acre than what I have sold.

Now, whether we regard the annual product of the land, or its selling value, it must appear that reclaiming swamps is, sometimes at least, a profitable business, and that is the proposition which my statement and remarks are designed to illustrate.

Statement of experiments made by Dr. SIDNEY WELLER, *of Brinckleyville, Halifax county, North Carolina.*

About three years ago I sowed, in the latter part of July, on a very poor spot of worn out land, some guano, at the rate of about 200

pounds to an acre, ploughing it under, and then sowing and harrowing in some buckwheat and rye, and afterwards clover-seed. Wherever the clover came up, I strewed thereon plaster, or gypsum, at the rate of a bushel and a half to the acre. The buckwheat I cut two months after sowing, and the rye in about eleven months. The result was, that each of the three crops was good, all having been sown at one time and on the same ground. A portion of the ground before manuring was too poor to produce a crop of any kind. Hence it may be inferred that the success of the experiment was owing entirely to the gypsum and the guano.

Encouraged from the above named experiment, I next tried guano for wheat, on a comparatively poor soil, at the rate of 200 pounds per acre. During the growth of the crop, there was a striking difference in its appearance in favor of the parts where the guano had been applied, and the yield, by actual measurement, had increased four-fold. On the first of March following, I harrowed over the field and sowed with clover-seed; after which I rolled the ground. As soon as the clover came up, I sowed the field with plaster, at the rate of a bushel and a half to an acre. The result was, that the clover on the part of the field where no guano had been applied was inferior, while the guanoed portion, like that in wheat, was about four times as good.

These experiments have convinced me that the effect of guano, as a renovator of the soil, is as enduring as other manures, and does not expend itself in one season, as has been heretofore supposed.

In the spring of 1852, I instituted a comparative experiment with four fertilizers, namely: guano, bone-dust, wood-ashes, and a clover-ley. A parcel of ground was selected which had been cropped with clover three consecutive years. After the first ploughing, I ran two deep furrows, with an opening or drill-plough, seven feet apart, over the clover-ley, and similar furrows over the adjoining ground, which was a part of a poor old broom-sedge field that had also been previously broken up. In the two furrows next to those on the clover-ley, after filling them with earth nearly level with the surface, I applied bone-dust mixed with loam, in the proportion of four-fifths loam to one-fifth bone-dust, at the rate of a bushel of this mixture to every 450 lineal feet. At the bottom of the next two furrows or drills on the clover-ley, I applied leached ashes, at the rate of about one bushel to 450 lineal feet; and next, continuing throughout the clover-ley, I strewed guano at the rate of two quarts and a pint, mixed with one-fourth part of plaster to every 450 feet, putting it at the bottom of the deep furrows or drills, in order that it might not come in direct contact with the seed-corn when planted, and thereby kill the germ. Next, a bull-tongue plough was run on each side of the drills, forming another set of drills or hollows, in which I planted "Ward corn," in single kernels, a foot and a half apart. At harvest time, I found that the crop where the bone-dust and guano had been applied was good, nearly equal in product, averaging about three ears to each stalk, and yielding, by estimate, about 60 barrels, or 300 bushels, to the acre; but on the part where the leached ashes were applied, the yield was quite inferior.

I will give one more experiment with fertilizers, which, from its peculiarity, may be regarded with some interest. Last winter it was

proposed that as many members of the North Carolina State Agricultural Society as might feel inclined, should deposite in one common fund $5 each, to be awarded in three graduated prizes—first, second, and third—(after reserving for the use of the society 15 per cent.) to those of the number who should produce the largest yield of corn on an acre of land, which, in an unimproved condition, would not yield more than three barrels, or 15 bushels—to be selected and determined by disinterested judges. Each member was to have the privilege of resorting to his own mode of cultivation.

The acre of ground selected for my experiment, in an unmanured state, it was judged, would not have produced more than 2½ barrels, or 12½ bushels; but by the aid of guano, plaster, super-phosphate of lime, and Chappell's fertilizer, connected with a light dressing of manure from the barn-yard, and compost heaps made of swamp mud, cotton-seed, and stable dung, I produced 14¾ barrels, or 73¾ bushels of corn, valued at $62 50, and this at a cost of about $20 for fertilizers and their application, to say nothing of the fodder derived from the stalks, blades, and shucks, and the increased fertility of the land, from which I expect to make a good crop of clover and wheat without additional manure. Besides, in the opinion of my neighbors, who are considered competent judges, had not the season been unfavorable from wet and drought, my acre would have yielded 8 or 10 barrels more.

I commenced the improvement of my ground in the winter, first by running a plough a foot deep, and then sprinkling in the furrow guano mixed with one-fourth by weight with plaster, at the rate of 150 pounds to the acre; and directly after, loosening the ground to a depth of 15 inches with a subsoil plough, finishing one furrow before another was opened. Next a light dressing of barn-yard manure was spread over and harrowed into the field, which was followed, in one part, by a sprinkling of compost, and in another with a dressing of Chappell's fertilizer mixed with one-fourth part guano, which were also harrowed in.

Just before planting, about the 20th of April, 1853, the ground was again subsoiled, and then worked off into drills 3½ feet apart with a subsoil plough, into each of which a sprinkling of Chappell's fertilizer was added. I then planted the drills with Ward corn, with the kernels nine inches from each other, which was afterwards thinned out to 18 inches apart. The field was kept as nearly level as practicable, by working it with coulters, cultivators, and harrows, one after the other. It may further be remarked, that, as I never sucker my corn, not only two ears were grown to a stalk, but many of the suckers themselves produced good ears.

In reference to Chappell's fertilizer, others who have tried it agree with me in thinking, that when used with one-fourth part of guano, it goes as far as an equal quantity of guano unmixed, though at a much lower cost.

Statement of Elmer Rowell, *of Federalton, Athens county, Ohio.*

Perhaps nothing connected with the manual labor of the farm is of so much importance as skill in ploughing; and among other things necessary to constitute the right kind of skill, is a knowledge of the depth

proper to plough. Land that has been ploughed a number of years at the usual depth, should be done deeper and deeper from year to year, until the greatest practicable depth, say one foot, is obtained. In connexion with deep ploughing, it is presumed the subsoil plough, in some soils, would be highly beneficial.

One reason for ploughing deeper and deeper each year must be obvious to every person who has witnessed the operation of leaching ashes. In like manner, as the potash of the ashes is dissolved and settles with the water through the ashes, is it not possible, probable, and even certain, that some, at least, of the constituents of the soil, or peculiar food of plants, or some of the elements of this food, subsides with the water in copious rains, and is deposited in the more compact earth directly under where the plough and harrow have loosened it? The writer has a field of some twelve acres, which was first brought into cultivation and planted with corn in the spring of 1811. This field is somewhat peculiar, as it consists of five or six different kinds of soil in as many localities. It was ploughed every year, and put in corn and wheat alternately, nine or ten years; after which a rotation of meadow, pasture, and wheat succeeded, until in the fall of 1839, when the first manure was applied, and this only on the poorer spots, not exceeding twenty loads of half a cord each to the acre. In the fall of 1841, it was sown with wheat, and in the spring following with clover, and pastured through the summers of 1842–3. In the spring of 1845, it was ploughed two inches deeper than ever before, and planted with corn, when it produced a heavier crop than it had ever done before. This result was undoubtedly obtained by deepening the furrow, which not only gave the corn a greater depth of earth into which to expand its roots, but also brought up and rendered available matters suitable for its nourishment, which had, in a series of years, leached from the loosened surface.

Another resource of the farmer by which to keep his acres full fed, and the cheapest, too, when rightly managed, requiring the least possible labor, is shelter, shade, or protection from the fierce rays of a summer's sun, and the winter's piercing, withering blasts. For this purpose I would name clover as the best remedy; but any of the grasses will answer as good purpose, if a full growth is suffered to stand. Among the grasses, the far-famed Kentucky blue-grass is pre-eminent—equal to clover, perhaps, except in depth of root, which is a great object with the skilful farmer. In addition to the fertility imparted to the soil by turning under a green crop—or rather, as I would have it, a dry crop—the ground, when thus protected, seems to exert a renovating energy, equal if not superior to the actual manure of the crop.

BREAD CROPS.

By *bread plants*, it is to be understood that they comprise those which contain, in one or more parts of their structure, a sufficient abundance of starch to furnish an essential article of food to man. Starch, or fecula, is that material which constitutes the principal mass of bread, although other substances usually occurring with it, (gluten and vegetable albumen) play an important part in regard to nutrition in a stricter sense, especially to the formation of muscle.

It would be interesting to give a complete summary of the production of our bread plants, of the manufactures and trade resulting from them, and of their geography, history and origin; but, for the want of sufficient statistical and other data, we must confine ourselves to such statements and facts respecting them as have come under our reading and observation. It may be remarked, however, that the early history of the bread plants is enveloped in obscurity, in the form of traditions and myths, according to which the gods themselves descended to the earth to confer the great gift upon mankind. For instance, in India it was Brahma; in Egypt, Isis; in Greece, Demeter; in Italy, Ceres, who gave corn to the natives and taught them to cultivate it. The ancient Peruvians and the Indians of North America had similar traditions or legends respecting maize, or corn.

INDIAN CORN.

Among the objects of culture in the United States, maize, or Indian corn, takes precedence in the scale of crops, as it is best adapted to the soil and climate, and furnishes the largest amount of nutritive food. Where due regard is paid to the selection of varieties, and cultivated in a proper soil, it may be accounted as a sure crop in almost every portion of the habitable globe between the 44th degree of latitude and a corresponding parallel south.

The corn plant, or its grain, frequently entered into the forms, the ceremonies, and the mythology of many of the Indian tribes, both in North and in South America, an instance of which may be illustrated in the following allegory, as related by Mr. Schoolcraft, of the Odjibwas: A young man went out into the woods to fast, at that period of life when youth is exchanged for manhood. He built a lodge of boughs in a secluded place, and painted his face of a sombre hue. By day he amused himself in walking about, looking at the various shrubs and wild plants, and at night he lay down in his bower, which being open, he could look up into the sky. He sought a gift from the Master of life, and he hoped it would be something to benefit his race. On the third day he became too weak to leave the lodge, and as he lay gazing upwards he saw a spirit come down in the shape of a beautiful young man, dressed in green and having green plumes on his head, who told him to arise and wrestle with him, as this was the only way in which he

could obtain his wishes. He did so, and found his strength renewed by the effort. This visit and the trial of wrestling were repeated for four days, the youth feeling at each trial that, although his bodily strength declined, a moral and supernatural energy was imparted, which promised him the final victory. On the third day his celestial visitor spoke to him. "To-morrow," said he, "will be the seventh day of your fast, and the last time I shall wrestle with you. You will triumph over me and gain your wishes. As soon as you have thrown me down, strip off my clothes and bury me in the spot, in soft fresh earth. When you have done this, leave me, but come occasionally to visit the place to keep the weeds from growing. Once or twice cover me with fresh earth." He then departed, but returned the next day, and, as he had predicted, was thrown down. The young man punctually obeyed his instructions in every particular, and soon had the pleasure of seeing the green plumes of his sky visitor shooting up through the ground. He carefully weeded the earth, and kept it fresh and soft, and in due time was gratified by beholding the matured plant, bending with its golden fruit and gracefully waving its green leaves and yellow tassels in the wind. He then invited his parents to the spot to behold the new plant. "It is Mondamin," replied his father, "it is the spirit's grain." They immediately prepared a feast, and invited their friends to partake of it, and this is the origin of Indian corn.

Although there has been much written on the Eastern origin of this grain, it did not grow in that part of Asia watered by the Indus at the time of Alexander the Great's expedition, as it is not among the productions of that country mentioned by Nearchus, the commander of the fleet. Neither is it noticed by Arrian, Diodorus, Columella, nor any other ancient author; and even as late as 1491, the year before Columbus discovered America, Joan. di Cuba, in his "Ortus Sanitatis," makes no mention of it. It has never been found in any ancient tumulus, sarcophagus, or pyramid; nor has it ever been represented in any ancient painting, sculpture, or work of art, except in America. But in this country, according to Garcilaso de la Vega, one of the earliest Peruvian historians, the palace gardens of the Incas were ornamented with maize, in gold and silver, with all the grains, spikes, stalks, and leaves; and in one instance, in the "garden of gold and silver," there was an entire corn-field, of considerable size, representing the maize in its exact and natural shape; a proof no less of the wealth of the Incas than of their veneration for this important grain.

In further proof of the American origin of this plant, it may be stated that it is found growing in a wild state from the Rocky mountains, in North America, to the humid forests of Paraguay; where, instead of having each grain naked, as is always the case after long cultivation, it is completely covered with glumes, or husks, as denoted by the cut on the succeeding page. It is, moreover, a well authenticated fact that maize was found in a state of cultivation, by the aborigines, on the island of Cuba, at the time of its discovery by Columbus, as well as in most other places in America first explored by Europeans.

The first successful attempt of the English in North America to cultivate this grain was made on James river, in Virginia, in 1608. The colonists sent over by the "London Company" adopted the mode then practised by the Indians, which, with some modifications, has been pursued ever since. The year following, thirty or forty acres were broken up and planted by the colonists near Jamestown. The yield at that time is represented to have been from two hundred to more than a thousand-fold.

In 1621, the Indians, Samoset and Squanto, visited the Pilgrims at Plymouth, and instructed them how corn should be planted, and the manner in which the ground should be manured with alewives. The colonists planted twenty acres with corn, and six acres with barley and peas. The corn produced well, but the other two failed. The same year, Edward Winslow and Stephen Hopkins visited the Indians at Namasket, in Middleborough, who received them with great joy, and regaled them with bread, called *mazium*, made of Indian corn. In 1629, the yield on Massachusetts bay was from two hundred to five hundred to one. Thirteen gallons of seed gave 52 hogsheads of corn of seven bushels each.

In the early settlement of Illinois, the yield of corn in some instances was a thousand-fold.

In 1621, corn sold in Virginia for 2*s.* 6*d.* (62 cents) per bushel; on Massachusetts Bay, in 1630, for 10*s.* ($2 50;) in New Netherland, in 1650, for 10 to 15 stivers per skepel, (15 to 20 cents per bushel;) in Rhode Island, in 1670, for 25 cents per bushel; on the Piscataqua, in 1680, for 75 cents per bushel.

From the flexibility of this plant, it may be acclimatized by gradual cultivation, in some of its varieties, from Canada to Mexico, or from Oregon to Patagonia; but, in either case, its character is somewhat changed, and often a new variety is the result. Throughout the Atlantic States this grain associates itself with the soil and climate adapted to the growth of the flowery dogwood, *(Cornus florida,)* or the red bud, *(Cercis canadensis,)* and generally may be planted at the season of the flowering of these shrubs.

The varieties of Indian corn are very numerous, exhibiting many grades of size, color, and conformation. Among the twenty sorts indicated on Plate I, we recognise the "Wild Corn" of the Rocky mountains, and its petit grandchildren, "Pop" and "Rice;" the early "Can-

ada," with tiny ears and flat, close-clinging grains; the "Improved King Philip," with its broad, oily grains and slender cob; the "Golden Sioux;" the starch-bearing "Tuscarora;" the "Jet-black New Mexican," of tortilla renown; the late green-keeping "Stowell Sweet;" the Virginian pure "White Gourd-seed," or New Mexican "White-flint," famous for homony and cakes; and the large "Gold-yellow Gourd-seed," with its swelling ears, of the South and West.

The varieties best adapted for the Middle and Southern States are the large white and yellow Gourd-seeds; the yellow "Shoe-peg," or "Oregon;" and the New Mexican and North Carolinian "White-flints." In the more northerly and Eastern States, the "Improved King Philip," or "Eight-rowed Yellow;" the "Twelve-rowed Dutton;" the large "Golden and White-flints;" the "Tuscarora;" the "Mammoth Sweet," and the "Stowell Late Green," are particularly deserving of culture.

By a very ingenious method, first discovered by Mr. A. A. Hayes, of Roxbury, and Dr. Charles T. Jackson, of Boston, Massachusetts, it will be found that if a watery solution of blue vitriol (sulphate of copper) be applied to a kernel of corn, longitudinally split, the germ, or "chit," only, becomes colored green, thereby beautifully defining the limits of the phosphates, by the formation of phosphate of copper. The same method may be applied to all seeds, tubers, roots, and stems of recent vegetables, except those producing oily seeds, and thus define the parts containing phosphoric acid, as indicated in Plate I.

If a grain of corn be split open, as above described, and thrown into a solution of sulphydrate of ammonia, the chit will soon be changed to a dark olive color, which arises from the change of the salts of iron into a sulphuret of that metal; a dark-colored matter forming with the ammonia, turns the vegetable coloring matter yellow, and the two colors combined produce an olive.

By preparing specimens of corn, or other grain, as above, and soaking them in a tincture of iodine, the limits of the starch and dextrine will be distinctly defined—the iodine striking an intense blue with the starch, and a deep Port wine red with the dextrine; so that, from this test, a rich violet will indicate the presence of both the starch and dextrine in the grain. If the oil be extracted from the transparent, horny part of the corn, by means of alcohol or ether, the tincture of iodine will show the presence of starch in that part of the grain associated with the gluten.

By these means we may easily cause any of our cereal grains to represent the extent and precise limits of its phosphates, iron, dextrine, starch, and oil, and form by the eye an approximate estimate of their relative proportions of these ingredients.

Among other curious results of these experiments by Dr. Jackson, is the proof that the relative proportions of phosphates in grain depend on the appropriating power of each species or variety; for, an ear of corn being selected which had on it two different kinds, namely, the Tuscarora and a variety of sweet corn, and these seeds being slit in two and immersed in the same solution, soon gave evidence of more than double the amount of phosphates in the sweet than in the other

variety. Now, since the kernels came from the same ear, and grew side by side, they obtained unequal quantities of phosphates from the same sap, derived from the same soil. A crop of sweet corn will take twice as much of the phosphates as the other variety, and, consequently, will sooner exhaust the soil of them; and also, if the soil is deficient, will require more phosphates.

Some interesting facts will also be noticed in the variable proportions of phosphates in different varieties of the same species of grain, and the great preponderance of them in Indian corn, beyond what is contained in the smaller grains, like barley, oats, and wheat—a fact that seems to explain their peculiar properties as food for animals; the more highly phosphatic grains being more likely to surcharge the system of adult animals with bony matter, producing concretions of phosphate of lime, like those resulting from gout. Perhaps that stiffness of the joints and lameness of the feet, common in horses fed too freely with corn, may be accounted for by this preponderance of the phosphates. Young animals cannot fail to derive more osseous matter from corn than from other food.

With regard to the relative proportions of starch in the different varieties of corn, it has been observed that the Tuscarora contains the most, but does not contain either gluten or oil. The same may be said of the New Mexican Black. Rice-corn and pop-corn contain the least starch, and the most oil. It will be remarked that there is a great difference in the mode of distribution of the oily and glutinous parts of corn; many of the Southern varieties having it on the sides of their elongated seeds, while the starch projects quite through the grain to its summit, and, by its contraction in drying, produces the peculiar pits, or depressions, in those varieties known under the name of "dents."

The horny or flinty portions of corn, when viewed in their sections under a good microscope, will be found to consist of a great number of six-sided cells, filled with a fixed oil, which has been successfully employed for the purposes of illumination. On this oil depend the popping qualities of corn; for, when the kernels are heated to a temperature sufficiently high to decompose the oil, a sudden explosion takes place, and every cell is ruptured by the expansion of gaseous matter arising from the decomposition of the oil and the formation of carburetted hydrogen gas, such as is sometimes used in lighting large cities, the grain being completely evoluted and folded back, or turned inside out. This property is remarkably strong in the pop-corn, and is common, in a greater or less degree, in all kinds of corn that abound in oil; but those varieties destitute of a horny covering, as the Tuscarora, will not pop under any circumstances whatever. This change in corn is one of considerable importance, so far as regards facility of digestion; for, after the decomposition or extraction of this oil, it is more readily digested by man, though less fattening to animals.

One important use of the oil in corn is undoubtedly to prevent the rapid decomposition of the kernels when sown in the soil, and to retain a portion of pabulum, or food, until needed by the young plant, and is always the last portion of the grain taken up. It also serves to keep meal from souring, as it has been observed that a flint-corn meal

will keep sweet for years, even when put up in large quantities, without being kiln-dried; while the meal of the Tuscarora will become sour in a very short time.

The colors of Indian corn usually depend on that of the epidermis or hull, and sometimes on that of the oil. If the epidermis be transparent, the color may depend either upon the oil or the combined particles of which the corn is composed; but if the hull be opaque, the grain will present the same color. For instance, the yellow color of the Golden Sioux is derived from the yellow color of the oil; and the Rhode Island white flint-corn from the colorless particles of its starch and oil, which are distinctly seen through its transparent hull; but red, black, and blue corn, owe their lively hues to the colors of their epidermis, and not to the oil.

The proportions of oil in corn, as far as it has been examined, varies from an entire absence to 11 per cent., according to the varieties employed. In the manufacture of whiskey the oil is saved during the fermentation, as it separates and rises to the surface. One hundred bushels of corn yield from 15 to 16 gallons of oil. When corn is hulled by means of potash ley, a portion of the oil is converted into soap, and the epidermis becomes detached. The caustic alkali also liberates ammonia from the mucilage around the germ. Oily corn makes a dry kind of bread, and is not sufficiently adhesive to rise well without an admixture of rye or other flour. The oil of corn is easily convertible into animal fat by a slight change of composition, and consequently serves an excellent purpose for fattening poultry, cattle, and swine. Starch also is changed into fat, as well as the carbonaceous substances of animals, and, during its slow combustion in the circulation, gives out a portion of the heat of animal bodies; while, in its altered state, it goes to form a part of the living frame. Dextrine and sugar act in a similar manner, as a compound of carbon, hydrogen, and oxygen.

From the phosphates of grain, the substance of bone, and the saline matters of the brain, nerves, and other solid and fluid parts of the body, are, in a great measure, derived. The salts of iron go to the blood—and these constitute an essential portion of it, whereby it is enabled, by successive alterations of its degree of oxidation during the circulation through the lungs, arteries, extreme vessels, and veins, to convey oxygen to every part of the body.*

The amount of Indian corn exported from South Carolina, in 1748, was 39,308 bushels; in 1754, 16,428 bushels. From Savannah, in 1755, 600 bushels; in 1770, 13,598 bushels. From North Carolina, in 1753, 61,580 bushels. From Virginia, for several years preceding the Revolution, annually, 600,000 bushels; from Norfolk, in 1791, 341,984 bushels; in 1795, 442,075 bushels; from City Point, in Virginia, in 1791, 21,180 bushels of corn and meal; in 1795, 33,358 bushels. From Philadelphia, in 1752, 90,740 bushels; in 1767, 60,206 bushels; in 1771, 259,441 bushels; in 1796, 179,094 bushels, besides 223,064 barrels of Indian meal. From Portsmouth, New Hampshire, in 1776, 2,510 bushels; in 1777, 1,915 bushels; in 1778, 5,306 bushels; in 1779, 3,097 bushels; in 1780, 6,711 bushels; in 1781, 5,587

*See Jackson's report on the geology and mineralogy of New Hampshire, pp. 255 *et seq.*

bushels. The amount of corn imported into the river Piscataqua, in 1765, was 6,498 bushels; in 1769, 4,097 bushels; in 1770, 16,587 bushels; in 1772, 4,096 bushels.

The total amount of corn exported from this country in 1770, was 578,349 bushels; in 1791, 2,064,936 bushels, 351,695 of which were Indian meal; in 1800, 2,032,435 bushels, 338,108 of which were in meal; in 1810, 1,140,996 bushels, 86,744 bushels of which were in meal.

The amount of Indian corn and meal exported from the United States within the last thirty-three years, is indicated in the following table:

Years.	Indian corn.	Value.	Indian meal.	Value.	Total.
	Bushels.	Dollars.	Barrels.	Dollars.	Dollars.
1820–21	607,277	261,099	131,669	345,180	616,279
1821–22	509,098	378,427	148,228	522,229	900,656
1822–23	749,034	453,622	141,501	476,867	930,489
1823–24	779,297	351,665	152,723	384,675	736,340
1824–25	869,644	429,906	187,285	448,167	878,073
1825–26	505,381	384,955	158,652	622,366	1,007,321
1826–27	978,664	588,462	131,041	434,002	1,022,464
1827–28	704,902	342,824	174,639	480,034	822,858
1828–29	897,656	478,862	173,775	495,673	974,535
1829–30	444,107	224,823	145,301	372,296	597,119
1830–31	571,312	396,617	207,604	595,434	992,051
1831–32	451,230	278,740	146,710	480,035	758,775
1832–33	487,174	337,505	146,678	534,309	871,814
1833–34	303,449	203,573	149,609	491,910	695,483
1834–35	755,781	588,276	166,782	629,389	1,217,665
1835–36	124,791	103,702	140,917	621,560	725,262
1836–37	151,276	147,982	159,435	763,652	911,634
1837–38	172,321	141,992	171,843	722,399	864,391
1838–39	162,306	141,095	165,672	658,421	799,516
1839–40	574,279	338,333	206,063	705,183	1,043,516
1840–41	535,727	312,954	232,284	682,457	995,411
1841–42	600,308	345,150	209,199	617,817	962,967
1842–43	672,608	281,749	174,354	454,166	735,915
1843–44	825,282	404,008	247,852	641,029	1,045,037
1844–45	840,184	411,741	269,030	641,552	1,053,293
1845–46	1,826,068	1,186,663	298,790	945,081	2,131,744
1846–47	16,326,050	14,395,212	948,060	4,301,334	18,696,546
1847–48	5,817,634	3,837,483	582,339	1,807,601	5,645,084
1848–49	13,257,309	7,966,369	405,169	1,169,625	9,135,994
1849–50	6,595,092	3,892,193	259,442	760,611	4,652,804
1850–51	3,426,811	1,762,549	203,622	622,866	2,385,415
1851–52	2,627,075	1,540,225	181,105	574,380	2,114,605
1852–53	2,274,909	1,374,077	212,118	709,974	2,084,051

According to the census returns of 1840, the amount of the corn crop of the United States was 377,531,875 bushels; of 1850, 592,071,104 bushels; showing an increase of 214,539,229 bushels. The total amount of corn raised in 1853 may be estimated at 600,000,000 bushels; which, at 40 cents per bushel, would be worth $240,000,000.

CONDENSED CORRESPONDENCE.

Statement of RALPH R. PHELPS, *of Manchester, Hartford county, Connecticut.*

This town formerly belonged to Hartford, and for many years the farmers would set fires here in the spring and burn over all the dry land to make pastures for their cattle. Thus the town was worn out, or rather burnt out, before its settlement; and "the iniquities of the fathers," in this matter, are "visited upon their children" to this day. I think the average yield of corn per acre is about 20 bushels without manure, and from 40 to 50 bushels with it.

My mode of cultivating is as follows: if a strong sward is to be turned over, or if the land is infested with insects, I prefer fall ploughing. I like a deep furrow, say from 7 to 10 inches in depth. After ploughing I give a thorough harrowing. When I plough in the fall, I apply the manure from my yard and hog-pen on the furrows in the spring, and cover it as well as I can with the harrow. If the ground is not ploughed until spring, I prefer to spread the manure before ploughing. I put from thirty to forty loads, say 15 bushels each, to the acre. This manure is made from loam, weeds, leaves, potato-vines and corn-roots, carted into the yards or hog-pens, and mixed with the litter and droppings of the cattle, sheep and hogs. As soon as the frost is out in the spring, the whole mass is dug over and thrown into heaps, and thus thoroughly mixed and fermented before using. After harrowing the ground, I mark it for rows each way, three feet apart. This is done with what I call a "planting gauge,"—a piece of common scantling, having three strong pins or teeth firmly set in it to mark the ground, with a pair of plough handles attached to hold it by, and a pair of old wagon thills to draw by. With this gauge, a man and a horse, a field is very speedily marked off, three rows at a time. The corn is then planted at the angles of the marks with a hoe, in the ordinary way. About a tablespoonful of plaster is generally put into each hill with the corn. When the corn is up so that the rows may be fairly run, I pass with the cultivator between the rows twice in a place, taking care not to cover the corn. When the corn has got somewhat past the ordinary size for weeding, I go through with the cultivator again, crossing the field, hoe thoroughly, and thin to three stalks in a hill. After this I use the cultivator as occasion requires, from two to three times; at each time at right-angles with the last. I make no hills.

I cultivate the potato in the same way, except that I make the ground with the horse-plough, omit hoeing altogether, and finish the cultivation by turning the earth to the hill with the plough.

When my corn begins to grow hard or gets glazed, I cut it up at the ground and set it up as I cut it, about twenty or twenty-four hills in a stack, binding the top with straw. In the fall, part of the corn is husked in the field in fair weather, and a part is carried to the barn to be husked in foul weather and winnings. In this manner I think my corn is sounder, and the fodder saved better and with less labor, than the

ordinary method of topping the stalks and letting the corn ripen in the hill. If I wish to sow wheat or rye on the corn ground, I throw the corn, as cut, on an ox shed, and draw it to an adjoining field. In this way I can get in a crop of rye or wheat in good season after corn.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

The manure commonly applied to the corn crop is that of the stable-yard; but for the last three years, I have been in the habit of drawing into the yard large quantities of swamp muck, first putting a layer of muck, and then a layer of manure as it comes from the stable; and thus continue alternately until the whole surface of the yard is covered several feet in thickness. By a light covering of corn-stalks, such as the cattle will not eat, and other litter from the stable, the yard is free from mud, and is suitable for the cattle to lie upon through the whole season. In the spring the manure is drawn from the yard and spread upon the land, at the rate of twenty or twenty-five cart loads, of 35 bushels each, per acre, and turned under to the depth of seven or eight inches. After a thorough harrowing, the ground is then ready for the seed.

The time of planting corn with us, is from the 10th to the 25th of May. The average product per acre is about 75 bushels shelled corn. Cost of production about 37 cents per bushel, with three times hoeing. A crop of 50 bushels to the acre will cost 50 cents per bushel, and one of 100 bushels may be raised for 25 cents per bushel.

Statement of ANTHONY M. HIGGINS, *of Wilmington, New Castle county, Delaware.*

Our corn tillage, considering the number of acres under cultivation, and withal on land so prone to grow weeds, will compare favorably with any other locality of the same extent in the State. This is especially the case in the section embracing the neat and thriving villages of Cantwellsbridge and Middletown.

Very little guano is used on this crop, as it is considered too high in price to pay well. Our farmers have two methods of managing a field of corn: One, to apply on a sod field, in August or September, previous to planting, from 25 to 50 bushels of quick-lime; the other is, to spread the lime in the spring, after the ground is flushed. I prefer the latter, as the cultivators diffuse the lime more equally over the surface; and, besides, it has a better chance to exercise its chemical properties upon the contents of the soil. Previous to its being ploughed in, I give it a good dressing of manure; then harrow well, and checker it out shallow, from 3½ to 4 feet each way, according to the strength of the land. We try to commence planting, in this meridian, about the 20th of April, and drop as many grains in each hill as will allow for casualties of birds, insects, &c. At thinning time, if the ground is strong, it will raise three good stalks; ordinarily but two is left in a hill.

The average yield per acre is about 40 bushels, though from 70 to 100 bushels have been raised. Price of corn per bushel at Brandywine, 65 cents.

Statement of J. E. McCLUNG, *of Bloomington, McLean county, Illinois.*

The yield of corn in this region is from 40 to 75 bushels to the acre. The cost of production, exclusive of the interest upon the cost of the land, is about 8 cents per bushel. It brings from 18 to 25 cents per bushel; though much the largest portion of this crop is fed to stock. The best method of feeding is to grind it, cob and all, and use the meal.

Two bushels of oats are usually sown to the acre upon our lands, and the yield is from 40 to 50 bushels. The cost of producing is about 10 cents per bushel; the market price about 20 cents.

Statement of WILLIAM J. PHELPS, *of Elmwood, Peoria county, Illinois.*

Corn being our great staple crop, and the basis of our agricultural profits, deserves particular notice, in order that its actual cost to the producer may be seen. The ground for this crop is fitted with one ploughing, which, though deep and thorough, is accomplished by a man or boy with a pair of horses, at the rate of two to two and a half acres in a day. It is marked into rows one way, with the same team, at the rate of twenty acres in a day; and, with the additional help of one hand, it is planted at the same rate; thus standing in rows at right-angles. It is cultivated in general with a small plough, drawn by one horse, which passes twice between each two rows, in cross direction, every ten or twelve days, making about four ploughings in the season, at the rate of four acres in a day—thus devoting one day's work of man and horse to the cultivation of an acre. The entire cost per acre to the producer, exclusive of ground rent, will appear from the following estimate:

For preparing ground	$1 00
For planting	25
For cultivating	1 50
For husking and cribbing	1 25
Total	4 00

The average yield to the acre for the last twenty years, in this vicinity, on well managed farms, has not fallen below 60 bushels. Seven cents per bushel, it will be seen, exceeds the actual cost of a bushel of this grain.

Statement of JOHN M. LESLEY, *of Danville, Vermilion county, Illinois.*

Corn is the staple production of this county. Its average yield is about 40 bushels to the acre, but in a good season from 50 to 65 bushels, weighing from 60 to 63 pounds. It usually bears a price of from 20 to 30 cents per bushel, and in time of scarcity 50 cents.

The time of planting varies from the 10th of April to the 20th of June; the time of harvesting, from the 20th of September to the 1st of November. Before planting, the ground is well broken and laid off both ways, when from three to seven grains are deposited in a hill. It is then covered with a shovel-plough or a cultivator; after which it is

harrowed. There are probably 10,000 acres of land in this county used annually for the production of this grain, which would yield in a common season 400,000 bushels, with an aggregate value of $80,000. From this amount we may safely subtract 100,000 bushels, which are used for home consumption, leaving 300,000 bushels for exportation, with an aggregate price of $60,000, which is the amount usually exported, and sold at prices varying from 28 to 40 cents per bushel.

Statement of EDWIN WINSHIP, *of Winship's Mills, Clinton county, Indiana.*

My plan of cultivating this crop, on grass or clover sod, is to "break up" in February or by the 1st of March, or on stubble as soon as the ground becomes settled. I plough as deep as possible with two horses; after which the field is marked off for planting, with the plough, from 3½ to 4 feet between the intersections, from the 10th of April to the 20th of May. As soon as the corn is up, a harrow is passed through it, twice in a row. Sometimes I use a two-horse harrow, taking out the front teeth, so as to stride the young plants without injuring them as it passes over the hills. This operation pulverizes the ground and kills the grass and weeds which are just starting up. As soon as the corn is two or three inches high, I pass twice through a row with a steel plate shovel-plough, which turns the earth from the plants. A boy may follow the plough with a small rake, to remove the clods that may roll against the corn. A few days after this I pass the plough across the first ploughing, and thin out the plants to four in a hill, pulling out by hand any large weeds or tufts of grass which may have appeared. I generally plough between the corn five times in the course of the season, and harrow once, splitting the ridges between the rows at the last ploughing. The hoe is not used in the cultivation, as a man, boy, and a horse will pass over as much ground in a day as four men will with the hoe.

The average yield of corn on the Wabash is about 50 bushels to the acre, costing from 8 to 10 cents per bushel.

Statement of JOHN SPING, *of Connersville, Fayette county, Indiana.*

The growing of corn is among the prominent pursuits of our farmers. This crop is put in from the middle of April to the middle of May by planting in hills formed into rows, with four or five grains to each hill. The yield is from 30 to 80 bushels to the acre, according to the condition of the land and the mode of cultivation. It is fed to our stock, but mostly to hogs.

Statement of WILLIAM S. PAYNE, *of Rushville, Rush county, Indiana.*

Corn is extensively grown here, the mode of cultivation being better than for wheat. Some of us plough our ground in the spring six or seven inches deep, harrow well, furrow it about four feet apart each way at right-angles, and running the plough deep. Let the season be dry or wet, we plant three grains to each intersection of the furrows.

Our land produces from 40 to 55 bushels to the acre without manure, and corn is worth at our nearest market from 30 to 36 cents per bushel.

Statement of J. BARTLETT, *of West Lebanon, Warren county, Indiana.*

Corn is the main crop with us. It is very easily raised, and requires but little labor, comparatively, to secure from 40 to 60 bushels to the acre. It commands a ready market at 35 cents per bushel.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

The ground is prepared for planting corn by breaking it up in early spring, with two strong horses, as deep as the plough can be made to penetrate. Then, between the 15th and last of April, the ground is marked off in checks or drills, and planted. The corn is dropped by hand, and covered with a small plough. The usual distance of planting, in good soil, is 3½ feet each way. The number of stalks intended to be left in the hill is three. When the plants are up about three inches, the ground is harrowed. After this, at intervals, it receives, first in one direction of the rows and then in the other, four successive ploughings. This is the common course pursued in the cultivation of corn in this neighborhood; but deeper ploughing, and a more thorough course or method of tillage, is attended with much better results. For the last twenty-five years, under the most adverse circumstances, we have not produced less than 40 bushels to the acre; nor have we, for the same time, under the most favorable conditions, produced more than 100 bushels. Indeed, 75 may be taken as an average. The best kinds for cultivation are the large and late varieties, white and yellow.

During the past season, corn was more or less affected with drought; yet one of our neighbors, F. P. Kinkead, who took the premium on corn at the Boyle county fair, produced 122½ bushels on an acre. The ground had been cleared thirty or forty years, but was never ploughed before three years ago. Two crops of hemp had been taken off since, and last spring it was ploughed, harrowed each way and rolled one, laid off in drills three feet apart, and the corn dropped in the drills eighteen inches apart, from two to three grains together, and covered with the plough. After this, it received all the attention necessary to insure a good crop. An acre produced 13,475 ears. There was no manure of any kind put on the ground, nor used in any way.

The average yield of corn in this section, when planted in good soil and properly cared for, is at least 60 bushels to the acre, and the cost of production, including rent of land, about 15 cents per bushel. The rent of an acre is about $4; preparing the ground, planting, tending, and taking off the crop, $5; cost of production, $9. The present price of corn on the farm is 25 cents per bushel. For the want of the proper facilities for getting to a distant market, it is seldom that any is shelled and sacked for exportation.

Statement of HOWARD M. ATKINS, *of Mount Vernon, Kennebec county, Maine.*

Corn is raised almost entirely on sward lands, broken up either in the fall or spring, but generally in the former, though it is not thought to produce so well as when ploughed in the spring. The reason why it is done in the fall, is because the farmer has much more leisure at that time than in the spring.

To prepare the land for corn after it is ploughed, some green manure is spread over it, and then harrowed until it is mellow. It is next marked off with a small plough 3½ feet apart; then manured with a shovelful to each hill. After this, the corn is dropped and covered to the depth of one or two inches, and hoed twice in June. It is ready to harvest in September.

The average price of corn with us is 90 cents per bushel.

Statement of DANIEL FULTON, *of Bowdoinham, Lincoln county, Maine.*

The best method of raising corn with us, is to plough grass land and plant potatoes the first year. In the spring of the second year, spread five cords of green manure to the acre and harrow it in. Then plough the land and furrow four feet apart, and mark across the furrows so as to place the hills 3½ feet apart in the row, putting five cords of fine old manure per acre in the hills. I plant one and a half inches deep, five kernels and one pumpkin seed in each hill. As soon as the corn is three or four inches high, I pass through the rows each way with a cultivator. I next follow the cultivator, pulling up the weeds that spring up among the plants, and loosen the earth with a hoe. Two weeks after, I cultivate as before, pull out the weeds, and thin the corn to three stalks in each hill, drawing a small quantity of earth around the hills with a hoe. At this time, wherever the corn is missing, I sow rutabaga seed. By this method I have raised 85 bushels of shelled corn, three cart-loads of pumpkins, and 15 bushels of rutabagas, to the acre.

Average yield of corn in this county, 35 bushels to the acre. Value, 85 cents.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachusetts.*

Corn, with proper management, is "fattening" to the soil, and becomes a source of "fatness" in all its applications. The very process of raising a good crop is just what the land requires at frequent intervals. It must be deeply and well ploughed and manured, and the after tillage must be good and thorough, and all this prepares it for future profit.

With regard to the time of ploughing for corn, opinions are at variance. Some prefer doing it in autumn, thinking thereby to have the soil lighter. On some lands this may be the best course. Again, there is a common opinion that when the land is ploughed in the fall it will prevent the ravages of worms, but this is incorrect. We noticed several pieces the last season, which to our knowledge were ploughed

in the autumn, where their ravages were horrible; while in others of similar soil, ploughed in the spring, no bad effects were visible. With another class of farmers the ploughing is done just before planting. The ground has then become dry and works mellow; and if thoroughly harrowed, it is light and friable to till through the season. As a preventive of worms, I have known the seed soaked in copperas water and saltpetre fully effective.

Seventy bushels of shelled corn to the acre, with us, is a large crop. The average is probably 40 bushels to the acre. Present price, 90 cents a bushel.

Statement of SIMON T. ASHETON *and* ELIJAH MYRICK, *Trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

Our land is naturally stiff and clayey, rather moist, but suffers severely from drought, and is somewhat rocky and unfeasible. Such land as this, for producing corn, is not so profitable as a light loamy soil. We get tolerably good crops, however, under the following management, per acre:

Cost of ploughing in September	$4 00
Cost of twenty-five loads of compost, consisting of one part of meadow muck and two parts of long stable manure	30 00
Cost of cross-ploughing deep in the spring, planting three by four feet apart, and twice hoeing	7 00
	41 00

The yield varies from 35 to 50 bushels per acre, besides the stalks and husks for fodder. Our corn is heavier than the Southern varieties, weighing about 60 pounds to the bushel.

If we have a parcel of land that can be turned over smooth, we prefer spring ploughing. Although the corn may not thrive so well at first, it will better resist the effects of a drought.

Statement of GROVE SPENCER, *of Ypsilanti, Washtenaw county, Michigan.*

Indian corn, with us, can be raised for about 30 cents a bushel. To avoid damage by the cut-worm, plough early in the spring, as soon as vegetation has well started, but in no case before it is in lively growth. Corn is now worth here from 50 to 62½ cents per bushel.

Statement of J. D. YERKES, *of Northville, Wayne county, Michigan.*

The cultivation of Indian corn is on the increase. The most esteemed varieties are the "eight-rowed yellow" and "dent." To produce and market an acre of corn will cost about $11, including interest on land. The stalks are worth $3 an acre, making the cost of the grain $8. At the present price of corn, (50 cents per bushel,) sixteen bushels is the smallest yield that will pay expenses. Our average yield per acre, the past season, was about 35 bushels. The ground

is prepared for a corn crop by ploughing late in the fall, or in the spring, to the depth of six or eight inches; mellow the surface with the harrow, mark it for rows both ways, about four feet apart, and plant four or five grains in the hill. The after-cultivation is done principally with the plough and cultivator.

Plaster is used with decided benefit in the production of corn, if applied as a top-dressing immediately after the corn makes its appearance out of the ground.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

I think I can speak of the whole State, when I say that its soil, climate, and seasons are more favorable to the production of Indian corn than any other crop. Corn is to the West what rice is to India and wheat to Egypt. Everything feeds on it; and the entire failure of this great staple, even for a year, would scarcely be compensated by the sacrifice of every other crop raised among us. We could better afford to lose every other crop than this.

The modes of cultivation of this crop differ with the soil and the amount of labor at command. The largest yield from a given space of ground could be raised, I presume, by drilling about five feet apart, with the stalks left at a distance of 10 or 12 inches from each other. This mode of cultivation requires more labor than the usual method of planting in checks four feet apart, and ploughing each way. Taking the whole State at large, and estimating the bad with the good farming, I suppose the general average of this crop would be seven barrels (35 bushels) to the acre. As an evidence of the effect, however, of judicious cultivation, I will state that a gentleman in the county opposite this, told me that he had gathered from a field of forty acres 800 barrels, (4,000 bushels,) or 100 bushels of corn to the acre, in his entire field. From one acre he gathered 24 barrels, (120 bushels.) We raise here almost every variety of this grain. The "large white" is preferred for bread, and the "large yellow" for stock; the latter containing a large amount of the alcoholic principle, and on that account is preferred by distillers, and, I presume, for the same reason it is thought more nutritious for stock.

Statement of H. L. BROWN, *of Fayette, Howard county, Missouri.*

The corn crop is the main stay of the farmers of this State. It enters largely into the food of every animal, and is also the main source for bread for our whole population. Indeed, too much dependence is placed upon this crop for feeding. The raising of so much corn tends rapidly to impoverish the soil, and is not so good for stock as a change of food. It would be very difficult even to approximate a general average of this crop throughout the county. Some farmers, by a careless method of cultivation, obtain but 20 or 30 bushels to the acre, while on clovered land, properly managed, the average would be from 60 to 70 bushels.

The cost of raising an acre of corn with us may be estimated as follows:

Interest on land	$0 90
Breaking up in the fall	2 00

Breaking up in the spring	$1 00
Harrowing and planting	1 00
Ploughing and thinning	2 00
Total cost	6 90
Value of 60 bushels of corn, at 30 cents	18 00

Profit, $12 90 per acre; or cost per bushel, 11½ cents.

Statement of ARMSTRONG O'HARA, *of Saint François county, Missouri.*

Corn, being our staple crop, is extensively cultivated. Our land produces from 35 to 40 bushels to the acre; cost of raising, 20 cents per bushel. It is sold in our neighborhood from 25 to 50 cents per bushel.

Statement of JOHN BROWN, Sen., *of Long Island, near Lake Village, Lake Winnipisiogee, New Hampshire.*

The island on which I reside is situated in about latitude 43° 40′ N., and comprises about 1,100 acres, the largest proportion of which is good arable land, the remainder being occupied by pastures or reserved as wood-lots. The soil naturally consists of a brownish yellow loam, which, when well tilled, becomes warm and retentive of manures. The subsoil is of a bright yellow, underlaid by a hard-pan, varying in depth and thickness. A specimen taken from a highly-cultivated field, which had produced 130 bushels of corn to the acre, as analyzed by Dr. C. T. Jackson, of Boston, gave the following results:

Mechanical separation of 1,000 *grains of gravel, sand, and loam.*

Coarse pebbles	90
Fine pebbles	260
Fine loam	650
	1,000

Chemical analysis of 100 *grains.*

Insoluble silicates	80.8
Peroxyde of iron	2.2
Alumina	4.0
Salts of lime	0.4
Magnesia, (a trace)	—
Phosphate of alumina, (a trace)	—
Vegetable matter	8.7
Water	3.9
	100.0

Five hundred grains of the soil were digested in boiling water: 2.3 grains dissolved. The solution was of a yellow color, and consisted of—

Vegetable matter	2.0
Mineral matter	0.3
	2.3

The residue from the solution before burning was acid; and after burning, alkaline. The acid was then a vegetable acid. The following substances were taken up by the water, viz: muriatic, sulphuric, carbonic, and phosphoric acids, soda, lime, magnesia, silica, iron, and manganese.

The rotation of crops generally adopted by me for more than thirty years has been, 1st, potatoes; 2d, Indian corn; 3d, wheat; and then lay down to grass, and continue it for mowing until "bound out"—say six or seven years. But the last season I made a successful experiment the other way, by planting corn the first year after "breaking up," instead of potatoes.

Early in the autumn of 1852, the ground was thoroughly ploughed, turning under the green sward, which was suffered to remain undisturbed until the first of May last, when about fifteen cart loads of 50 bushels each of well-rotted barn-yard manure were applied broadcast to the acre, and carefully harrowed in. On about the 25th of the same month, twenty-two loads of equal capacity of green, unfermented stable and hog-yard manure, made during the winter or fall preceding, were spread uniformly over each acre, and immediately ploughed in, harrowing down the surface quite level and smooth. On the 30th of May I planted my corn in hills, four kernels to each, three feet apart one way, and two feet the other. When the corn was up about three inches high, it was neatly hoed, without the aid of cultivator or plough, thinning out the plants three to each hill. In the month of July, the corn was again dressed with the hoe, lightly moving the surface of the soil, sufficient to keep down the grass and weeds, without making any mold, or hill, leaving the ground even and smooth. I prefer working with the hand-hoe to clear the weeds from the plants, instead of the cultivator or plough; for, when the latter are used they stir the ground too deep, cutting many of the tender rootlets of the corn, which greatly injures the crop. It has long been my practice to plough under a liberal coating of green stable manure a few days previous to planting, which, in my judgment, should lie undisturbed by any implement during the growth, in order that it may impart its whole benefit to the crop.

Early in September, when the ears were fully formed, and their silks began to wither and dry, I "topped" my corn, and preserved the stalks for winter fodder the usual way. On about the 9th of October, I harvested the crop, "husking" it immediately after gathering, and stored it in the ear in my granary for future use. The result of the experiment was, that I raised 104 bushels of shelled corn to the acre, while the average yield in the vicinity of the lake was estimated at 30 to 40 bushels.

We have a home market for all of our surplus produce in the manufacturing villages of this region. The present price of corn is $1 per

bushel. Estimating the profit of growng an acre, based on my last crop, the following would be near the truth:

104 bushels of corn, at $1	$104 00
4 tons of husks and stalks, at $8	32 00
	136 00

The value of the labor employed in the cultivation, including the drawing of the manure, at 75 cents per day, was $37; leaving a net income of about $100 per acre for the use of the land and the manure.

There are several things connected with the above-named experiment which it would seem necessary to explain; and these are, the mode of selecting the seed for planting, and the close proximity of the hills. It had been my rule, for a succession of years, to select well-filled ears of the "King Philip," or Northern eight-rowed yellow corn, with cobs having small butt-ends, of good length as well as uniform size; the second ripe in the field, and taken from stalks bearing more than two ears to each. The result has been, I have produced a variety of corn, apparently fixed in its character, which sometimes bears my name, (Brown corn,) having large kernels and a small cob, varying from 10 to 13 inches in length. The largest crop I have ever raised was 136 bushels to the acre, weighing in the ear 9,520 pounds, or 70 pounds to the bushel, and 59 pounds per bushel when dried and shelled.

Those who have been accustomed to plant their corn in hills from four to five feet apart may be struck with the closeness of my planting, which is only three by two feet. From the comparatively dwarfish growth of my corn, I was induced some years since to plant a field at various distances apart; and the result of my experiment was, that I obtained the greatest yield by the mode I now adopt.

Statement of Joseph Winslow, *of Epping, Rockingham county, New Hampshire*

The following is a statement of a crop of 190 bushels of corn grown by me on one acre and 113 rods of ground:

Thirty-two loads of stable or yard manure	$32 00
Hauling and spreading the same	7 50
Ploughing and harrowing	10 12
Planting	4 87
Seed	50
Hoeing and cultivation	15 37
Harvesting and husking	15 75
Interest on land, and taxes	10 90
Cost of raising	97 01
Value of 190 bushels of corn, at 92 cents	$174 80
3½ tons of fodder, at $10	35 00
	209 80
Profit	112 79

The fore-named crop was planted on the 14th of May, the rows crossing each other at right-angles, three feet each way, with five grains of "eight-rowed yellow flint corn," or 16 quarts in the lot. The stalks were topped off on the 22d of September, and saved for fodder; and the corn harvested and husked October 12th. The weight of a bushel of shelled corn, thoroughly dried, (January 16, 1854,) was 59 pounds; 68 pounds of ears, before shelling, produced a bushel of grain, leaving only nine pounds of cobs. The cost of raising was about 51 cents per bushel.

Statement of SAMUEL WEBBER, *of Charlestown, Sullivan county, New Hampshire.*

With us there is no established rotation of crops, each man doing what is right in his own eyes. Some have one system, some another, while others have no system at all. Generally speaking, land is broken up from the sward, manured, and planted with potatoes or Indian corn; then kept a year or two more in tillage, with these or some of the small grains; after which it is laid down to grass, for hay.

Of corn, 90 or 100 bushels to the acre is the maximum yield; but 60 or 70 bushels is considered as a good return, while the average yield is not more than 40 or 50 bushels per acre. If the land is economically cultivated, 30 or 35 bushels will pay expenses.

In harvesting, the corn is cut up near the roots when the kernel is well glazed, and made into stooks, or shocks, in the field, where it is kept until dry; though some still practise the old mode of "topping." When husked, the corn is usually put into cribs, made of laths or slat-work on the sides, so as to give free ventilation to the ears. These cribs are sometimes constructed in a small barn or corn-house, built expressly for the purpose, while others spread the husked ears on the floors of the lofts of their buildings.

Statement of WILLIAM H. COOKE, *of Howard, Warren county, New Jersey.*

No guano is used in this neighborhood in the production of corn. We prepare our ground by ploughing up a Timothy or clover sod early in the spring; furrow three and a half feet apart each way, and plant from the 1st to the 20th of May. We plough three times between the corn, and use the hoe sufficient to clear out the grass and weeds. The average yield is about 35 bushels to the acre, which brings about 60 cents per bushel as soon as shelled. The cost of production is about $7 per acre, including interest on the land.

Statement of J. P. ROUNSVILLE, *of Rounsville, Alleghany county, New York.*

For corn, we turn over the sod in the spring, and not in the fall, as many think that land which lies exposed to the sun and air for a length of time becomes somewhat exhausted. After harrowing, it is planted with a few handfuls of lime, ashes, and plaster, in mixture, on each hill, about the 20th of May. The crop is cut up and shocked a short time before the kernel is completely out of the milk. The average yield, under this treatment, is 60 bushels per acre. Cost of raising, and in-

terest on land, about $15 per acre. The price for the last two years has been 62½ cents per bushel. It is more profitable for feeding to be ground, but not with the cob, as I have known it, thus mixed, so to inflame the stomachs of horses and cattle eating it, as to prove fatal.

Statement of F. W. Lay, *of Green, Monroe county, New York.*

We raise considerable quantities of corn in this county, and feed it not only to our hogs, but to our horses and other stock. We think it more profitable feed than oats or other grains. The most successful way of cultivating it among our best farmers, is to plough the ground in the fall, (old swarded meadow or pasture is preferred,) and drag and cultivate the soil as much in the spring as possible. The seed is generally planted, without any preparation, from the 15th to the 20th of May, about three feet and nine inches apart.

I have tried various articles sprinkled around the hills after the corn came up, such as lime, plaster, wood-ashes, bone-dust, and horn-shavings; and have also covered them with dirt around the hills at the time of planting, but could seldom see any marked benefit. We run a one-horse cultivator through the rows as soon as the corn is up so as to be seen, and dress it out with a hand-hoe. This is repeated twice, and sometimes three times. Of late, some farmers have adopted the plan of using the two-horse wheel cultivator to run through the rows, and when the land is soddy or hard, its advantages are obvious. The middle teeth are taken out, and two rows of corn are cultivated at once, the horses walking each side of the row. This requires a careful driver and a steady team. In this manner, a field can be worked and cultivated better than any other way. Our corn is always cut up and husked, and the stalks carefully secured. An acre of fodder is thought to be nearly equal in value to an acre of hay.

Statement of Herman Powers, *of Lewiston, Niagara county, New York.*

The best soil for wheat is not usually a very preferable one for corn, although it is somewhat extensively cultivated in this county, and brings a fair return. Corn land requires more of the phosphates and vegetable mould than wheat, and it is found in considerable quantities in the basin of Lake Ontario.

The variety of corn preferred, as most suitable to our climate, is the "Dutton twelve-rowed yellow," which, on an average, yields about 50 bushels to the acre; although 100 bushels are frequently obtained. The most successul mode of tillage has been found to be this: to spread a liberal dressing of manure on a clover-ley in the fall, turned under by deep ploughing for the purpose of destroying the grub-worm by the action of the frost; and in the spring the surface is mellowed by frequent harrowing, care being taken not to disturb the clover sod. We plant in hills, the rows three feet apart; four stalks in a hill.

The Tuscarora Indians, who have a reserve in this town, grow a description of corn which they call the "Tuscarora white." It was introduced into this region by them, when they emigrated from North Carolina, in 1712.

Before dismissing the subject of corn, it may be proper to mention the great value of the stalks for fodder when seasonably cut and properly cured. They should be cut up near the roots as soon as the kernels of the grain commence glazing, while the stalks are yet green, and then cured and kept dry. Much waste is incurred by feeding them on the ground. The most approved method is to chop them in a cutting-box, in pieces not over half an inch in length; put them into a tub and moisten and mix them with a little meal, when cattle will eat them with the greatest relish, and without waste. Fed in this way, the stalks from an acre of corn will be found in value, in addition to the crop of grain, nearly equal to the grass which could be grown on the same space.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Indian corn with us is grown to advantage upon a good, rich, gravelly or sandy soil. To raise it upon a clayey soil is an up-hill business. The greatest hindrance we experience is severe drought in July and August. This difficulty can be partially obviated by deep ploughing, heavy manuring, and a frequent stirring the earth with the corn plough. Fall ploughing will generally prevent the depredations of the wire-worm.

The expense of raising corn per bushel is about 12½ cents, as follows:

Ploughing once, per acre	$1 38
Harrowing once	38
Marking for rows	38
Planting	1 00
Seed, six quarts	20
Plaster, and putting it on	38
Cultivating among the corn both ways	76
Hoeing or half-hilling	1 00
Cultivating second time both ways	76
Hoeing second time	1 00
Cutting and shocking	1 00
Husking and cribbing, 4 cents per bushel	1 60
Shelling and delivering	1 00
Total	10 84
Value of stalks and husks per acre	6 00
	4 84

Forty bushels is about an average per acre, which makes the expense of raising, exclusive of interest on the land, about 12 cents per bushel.

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

Sod-land with us is always broken up for corn. If ploughed in the fall it is better, and is more apt to kill the corn-worn called the "grub" than when ploughed in the spring. By ploughing the land in the fall,

the soil loses its tenacity, is lighter, and more easily worked. I harrow the land after ploughing, and cross-plough it for planting. In a strong soil I put five or six kernels of corn in each hill—six are none too many. Good land will support six stalks as well as four, and give as large a yield on each stalk. I soak the seed in water and roll it in plaster. Care should be taken that the seed be dropped precisely in the angles made by the plough, so as to keep the rows even both ways; otherwise much of the corn, when large, might be broken by ploughing or hoeing. As soon as the plants are three inches high, I plaster them and commence the cleaning process. The cultivator is mostly used, being a substitute for the plough. I hoe twice; the second time hilling it. Keep the field as free from weeds as possible. I cut the stalks before the frost comes, and use them as fodder. They help along through our severe winters as a relish for cattle and sheep, which do much better on such a change of food than if kept steadily on hay. Cooked corn is preferable to raw for feeding, and ground, to whole or unbroken.

Thirty-five bushels of corn per acre for medium land is a good yield, though some of our best farms yield, when properly cultivated, 50 bushels per acre, and frequently as many as 60 are raised in favorable years. The cost of production depends upon the quality of the soil and the season. A wet season causes the grass to grow rapidly in the corn-fields, and requires more careful hoeing and tending.

Farmers will profit by planting a large quantity of pumpkin-seeds with their corn; the vines do not injure the corn. Often as many as three hundred wagon loads of fine pumpkins can be raised in this way, and the same number of bushels of turnips may be grown in the furrows in a fifteen-acre field. The turnip-seed should be sown about the first or middle of July, and covered with a hand-rake. They acquire a fine growth, and ripen early in the fall, making, when cooked, excellent food for hogs; and when eaten raw, healthful food for cows.

Statement of JOHN B. YOUNG *and* JAMES DEMOTT, *of Ovid, Seneca county, New York.*

Indian corn, including interest on land, will cost from $12 to $18 per acre. The estimate of expense made by a practical farmer, and the average crops produced by him for a term of years, is as follows:

Ploughing and fitting one acre	$4 00
Half of the manure chargeable to corn crop	1 00
Seed	14
Planting	1 00
Cultivating before hoeing	1 50
Hoeing first time	1 00
Cultivating and ploughing second time	1 50
Hoeing second time	50
Cutting up and "stouting"	1 00
Husking and cribbing	3 00
Interest on land, at $50 per acre	3 50
	18 14

Value of 50 bushels of corn, at 56 cents	$28 00
Cost of production as above	18 14
	9 86
To which add the value of the corn-stalks	4 00
Profit per acre	13 86

From the above estimate it will be seen that the largest amount of labor applied, yields the greatest profit.

The mode of harvesting this crop is to cut it up near the ground, and set about twenty-five hills in a "stout" and tie the tops. It will then stand until cured. When it is husked, the corn is put in cribs, and the stalks bound and housed, or otherwise secured.

Statement of JOHN HURLBUT, *of Arkport, Steuben county, New York.*

Corn is our most important grain crop, and when connected with stock raising, the fodder, judiciously saved and fed, will go far towards paying for the extra labor in tending the crop. Few farmers duly appreciate the value of corn fodder. It is worth more for feeding milch cows than the best of hay. In a former communication, (see Patent Office Report for 1852–3, page 194,) I gave a detailed statement of the raising of this crop, and will not repeat it here. I would merely state, that three essential points must be observed in its cultivation, if the farmer would look for a golden harvest: apply a heavy coat of manure, plough deep, and cultivate thoroughly. Without these we cannot expect success.

Statement of JOSHUA HARRIS, *of Welche's Mills, Cabarras county, North Carolina.*

The last crop of corn in this region was very light. We have just finished putting up, and find it to be only a half crop, owing to a long-continued drought, say from the 22d of June to the 3d of August. Corn is now selling from 40 to 45 cents per bushel.

Statement of JOHN W. EVANS, *of Scio, Harrison county, Ohio.*

The average product of corn to the acre in this region is about 40 bushels, although some crops exceed 120 bushels to the acre. The cost of production is 10 cents per bushel. We generally break up sward land in the winter, harrow it well before planting, and mark it out 3½ feet apart both ways, covering it with hoes. When the corn is from three to four weeks old, we keep the ground loose with the cultivator and double shovel-plough, to check the growth of grass or weeds; cut up the crop in the fall, and sow the ground with wheat.

Statement of JOHN H. TARR, *of Liberty, near Mount Vernon, Knox county, Ohio.*

Corn can be raised to better advantage in this section than any other grain. The best mode of cultivation is to plough a sward of two or

three years' growth, or a clover-ley, early in the spring, and let it lie until just before planting, which should be about the 1st of May if the season is favorable; then, with a large harrow run lengthwise the furrows, until the surface of the ground is finely pulverized. Mark off the field, 3½ feet each way, with a plough, and plant four kernels to a hill, and work, in the course of the summer, with a harrow and cultivator, keeping the ground free from weeds and grass with the hoe. Cut off the corn in September, and husk when dry. In this manner, in favorable seasons, we raise, on good land, from 50 to 100 bushels to the acre, though an average crop is only from 40 to 50 bushels. Corn is now selling at 33½ cents per bushel.

Statement of JACOB KNOOP, *of Elizabeth, Miami county, Ohio.*

Corn is our principal crop, many fields of which, in this vicinity, have been cultivated with success for fifteen or twenty years without any material diminution of yield. The average yield per acre is about 50 bushels, but 80 or 90 bushels are not an unusual crop from our bottom lands.

The price of corn is from 35 to 50 cents per bushel. A large portion of our crops is manufactured into whiskey, and the balance fed to stock or sent to New York.

Our mode of culture is simple. We first plough the land deep in April, and plant about the first week in May, in rows, about four feet apart each way. As soon as the corn is up we harrow the land thoroughly, and then run two furrows between the rows with a shovel-plough, thinning out the plants to three or four in each hill. After this, we use the plough and cultivator for three or four successive times. The "large yellow" and "white corn" are the varieties mostly cultivated.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

Corn has been but little raised here before this season. With the same culture usual in the Middle States, it produces from 15 to 30 bushels to the acre. It has been thought that it could not be grown here in consequence of the climate, but this season proves it beyond a doubt.

Statement of H. A. CASE, *of Troy, Bradford county, Pennsylvania.*

The "eight-rowed yellow" variety, which is preferred here, is generally planted on the sod, about the 12th of May, and by some about the 1st of June, in order to avoid the worms. The rows are about three by four feet apart, with from five to six kernels in a hill. As soon as we can see the rows it is plastered; then the cultivator is passed through it, with a man going behind to straighten up such corn-plants as may have been disturbed, without the use of the hoe. When the corn is about a foot high it is again harrowed or dragged, straightened up, and left to itself. By some, ashes and plaster in equal quantities are applied to the hill at this stage of growth. In the fall, the

corn is cut up and "stouted" in small stouts, or stooks, in the field, and left there until the stalks are cured, after which it is husked out and the stalks stacked for fodder. Many of late sow corn for fodder, with excellent success. The average yield, when cultivated as above, is from 80 to 120 bushels of ears to the acre. Average price for the last ten years, 50 cents per bushel.

Statement of Isaac R. Evans, *of Harrisville, Butler county, Pennsylvania.*

Corn, with us, is the next crop in value to wheat. The best mode of cultivation is to break up a piece of old sod in the fall, or early in the spring. We next drag the ground without further ploughing, and mark it out both ways, about three feet apart. I mark my corn ground for planting by driving a sled over it, which makes two marks at a time instead of one. We plant from the 10th to the 20th of May. After the corn is up, we apply ashes, lime, or compost to it, on the hill. About a week before the first hoeing, we run a harrow over the field, letting the boys follow to set aright all young plants which have been bent down or removed. We then plough and give it a dressing with the hoe, following it with two more ploughings and dressings, at intervals of the same length, which will be accomplished about the 4th of July. About the 10th of September, we cut the corn for harvest. The common yield is from 50 to 60 bushels to the acre, which is raised at a cost of about 33 cents per bushel. The price in market has stood at 40 cents per bushel for several years.

The best method of feeding corn is in the meal. There is a loss of at least one-fourth by feeding it whole to cattle or sheep. We generally grind the ears, cob and all, in a mill similar to a tanner's bark-mill. The cobs are known to contain a considerable quantity of nutriment, and, besides, this saves the trouble of shelling.

Statement of H. N. McAllister, George Buchanan, James Alexander, J. K. Shoemaker, *and* William J. Waring, *being that portion of their report which relates to corn on the "Oakwood Farm," near Bellefonte, to the Centre county Agricultural Society, Pennsylvania, as the result of their personal experience and observation.*

A clover or Timothy sod is always preferred for corn; and having been prepared by a heavy dressing of barn-yard manure, or, when that could not be had, by having suffered at least a portion of the previous summer's growth of grass to fall, the ploughs (soil and subsoil) are introduced either late in the fall or early in the spring. By the former, the soil is turned up to the full depth to which at any time previously it had been ploughed, say from six to eight inches. By the latter, following in the track of the former, the subsoil is broken up to the depth of from four to six inches more. The manure is thus deposited between sod and the loosened subsoil. The capacity of the subsoil for retaining moisture is thus greatly increased, and the sod is placed in a situation to act throughout the season, as mulching to the roots of the corn, which, from the deeply-marked furrows, soon penetrates the sod, and amid the manure beneath. The ground is next pulverized by two or

three successive harrowings as early in the spring as the nature of the season will allow. Should grass appear, a two-horse cultivator is used, so as completely to check and suppress its growth. The ground is then slightly marked in rows, east and west, three feet apart, and transversely, just before planting in rows, somewhat deeper, four feet apart. Four grains are dropped to a hill, with a pumpkin-seed in every fifth hill of every fifth row, making one pumpkin-seed to every twenty-five hills. Gypsum is in very general use. It is scattered upon the hill by some at the time of planting, but more generally about the time the shoots first make their appearance, in the proportion of from a peck to a half bushel to the acre. One-horse cultivators are used between the wider rows within a week or ten days after the shoots of corn appear; and having been passed back and forth, they are immediately turned in the opposite direction, followed by a boy to straighten up and remove clods from the corn, and to extract from every hill all above three stalks. In the month of June, the double shovel-plough is introduced, and is passed backwards and forwards, first between the narrow rows, and again between the wider ones. A short swingletree is used, to prevent breakage of the corn. Clover-seed is now sometimes sown, followed by a peck of gypsum to the acre, scattered broadcast. The clover occasionally succeeds, but it fails three times where it succeeds once.

Corn thus cultivated upon our best land, in a good season, produces from 60 to 80 bushels of dried shelled corn to the acre. One hundred bushels have been produced. The average product, however, of our valleys, under the ordinary tillage, is not over 30 bushels per acre. Horses on the Oakwood Farm have had no other food but corn, grass, and hay, for four years, except when occasionally off the farm; although they have been almost constantly employed, they have been in good condition, and entirely free from the diseases to which horses fed on chopped rye are liable. Our own experience accords with that of every person in the county with whom we have conversed on the subject.

Statement of N. LINTON, *of Cochransville, Chester county, Pennsylvania.*

The best mode of cultivating corn is to plough old sod ground, as deep as circumstances will permit, a few weeks before planting; and if a good coat of manure can be afforded, and ploughed under, it will greatly increase the amount of the crop. The ground should be thoroughly harrowed and pulverized before it will be ready for the drill. The rows should be drilled four feet apart, and enough seed put in the ground to insure its coming up sufficiently thick. The corn should be well worked four or five times with the cultivator. All grass and weeds should be destroyed, and the young plants thinned out to a proper distance apart when about a foot high; and this last is a very important matter, and requires some judgment and skill—for if it be left too thick, it will be very injurious to the crop. The yield is from 40 to 100 bushels to the acre, though some ten miles south of us 120 bushels have been produced.

Corn sells at the present time, delivered at the railroad, for 58 cents

per bushel, and it costs 8 cents a bushel to transport it to Philadelphia.

The smallest yield of corn or oats that will pay expenses, at present prices, is 20 bushels to the acre; of wheat, 10 bushels.

Statement of PETER GROSS, *of Schnecksville, Lehigh county, Pennsylvania.*

Indian corn in our county is a good crop, giving a certain return. The average product per acre is about 40 to 50 bushels; the price, 65 cents per bushel. The best yield is produced by ploughing, and planting the following spring, three feet apart each way, with four or five grains to the hill; then harrow and plough frequently, to keep the ground perfectly mellow and clean; the cultivator is also occasionally used.

Statement of JOSHUA S. KELLER, *of Orwigsburgh, Schuylkill county, Pennsylvania.*

Indian corn is an important crop with us, on which depends our pork, and a great deal is fed to horses and mules. I consider it also among the best adapted grains for man. I am unable to say what might be an average crop; from 50 to 100 bushels can be raised on our best lands under favorable circumstances—the former is frequent, and the latter seldom; average price 62½ to 65 cents per bushel.

Statement of C. H. HEYDRICK, *of Utica, Venango county, Pennsylvania.*

In the selection of ground for corn, we choose a meadow, clover-field, or old pasture; if wet, or "spouty," we drain thoroughly, after which we manure at the rate of twenty-five or thirty loads to the acre; or more, if the manure is not of very good quality. We spread one load at a time, and plough it under immediately, as the fertilizing gases escape very rapidly. It would also be advantageous to sprinkle a handful of plaster over each heap when deposited upon the ground, for the purpose of fixing the ammonia, which would otherwise escape. Ashes are an excellent manure for corn lands.

Corn requires a greater depth of furrow than it generally receives; but this must depend upon the nature of the soil and subsoil, new land requiring shallower ploughing than old. Nine inches with subsoiling is shallow enough for most old lands. In ploughing, the furrows should be well turned, so that no grass will harrow up. When left a few days to dry, the land is harrowed sufficiently to afford loose soil enough for covering the corn, but not enough to make the ground very smooth; for, in that case, the rains which follow are very apt to make it heavy. In laying off the land for planting we mark shallow, being careful not to disturb the sward. The distance between the rows is regulated with reference to the variety of seed to be planted; the larger the stalks, the greater the distance apart; for the "eight-rowed yellow," I would say about three feet.

The best rule that can be laid down as to the time of planting, is to wait until the weather becomes settled, the ground warm, and in good

condition to receive the seed, which, in this latitude, takes place from about the middle to the last of May. The judicious farmer will provide himself with two varieties of seed—one, of the best grown in his vicinity, to be planted when it can be done at the proper time; the other, a variety adapted to a colder climate, to be planted when the spring has been unfavorable, or for second planting in the event of the failure of the first.

The ground being prepared, which should not be done long before planting, let the most careful hands drop the seed, four or five grains in a hill, distributed over a space of six or eight inches in diameter; and others following, covering every grain with a hoe, so that the birds may not get a taste. All preparations like tarring I consider injurious. If the birds commence taking up the corn, the cheapest and most effectual remedy is to feed them by sowing corn broadcast upon the field; a bushel or two will protect a whole crop. Plaster may be applied at the time of planting.

I have observed that corn growing on a sward generally looks rather feeble until decomposition begins to take place; after which, it outgrows that planted on stubble-land, although the latter may have looked much more promising in the earlier part of the season.

As soon as the plants are fairly up, the process of working should commence. If grass or weeds have made their appearance, a corn harrow or cultivator should be passed between the rows, and followed by hoes, exterminating every weed and particle of grass; that growing in the hills should be removed by hand. Let the first dressing be effectual, and the after-culture will be easy. Dust a small quantity of plaster on each hill at this stage of the crop, or sow a larger quantity broadcast, and apply ashes, if it has not been done at planting time; keep clean with a shovel-plough or cultivator, finishing with an ordinary plough, passing three times in a row, the third time very deep; let those who follow set up the corn, carrying hoes for the purpose of cutting out grass and weeds, and dressing such hills as need it; very little hoeing will be necessary; avoid hilling as much as possible. The working should be finished about the 4th of July, when the field should be perfectly free from weeds.

Cultivated in this manner, land will yield at least 100 bushels of sound shelled corn per acre; and the cost of producing it will be but a trifle greater than that of producing half the quantity.

Of the methods of harvesting practised in this vicinity each has its advocates, and under particular circumstances all are probably best; but, generally, "topping" is preferable, because it is less laborious than cutting off at the ground, as the fodder may be well cured, and is little inferior to the best of hay; the corn, also, is more easily husked, and comes off in a fine condition for cribbing.

Seed-corn should be selected in the field at the time of "topping" or cutting up. Stalks producing the earliest and finest should be left standing until perfectly ripe, when it should be gathered in fine weather, leaving a part of the shucks, or husks, by which it may be braided or "traced" in bunches convenient for hanging up, in a dry place, as hard freezing destroys the vitality of corn when damp. In saving from small-eared varieties, select from such stalks as produce two or more perfect

ears. In large-eared varieties, I do not think it profitable to encourage the growth of two ears to the stalk, as two are seldom equal to one good one.

With regard to the changes which may be wrought in a variety by cultivation, I cannot give a better illustration than the history of the "Vermont yellow," that I cultivated a few years ago. Its characteristics were, a short stalk, slender above the ear, strong below, ears small, with eight rows, thick at the butt-end, growing near the ground, and frequently having a stem two feet in length. My plan of selecting seed from this variety was, to choose from such stalks as produced two or more ears, rejecting those with large butt-ends, and such as were not set close to the stalk. Such seed was hard to find the first year. The second year nearly one-half of the stalks produced two ears, and there were fewer long stems and larger butt-ends. A milder climate had also produced another change; many ears appeared with ten or twelve rows. This induced me to improve the size of the corn, and accordingly I selected as before, adding such ears as contained more than eight rows, together with a few ears of a larger sort. Continuing this system a few years, I obtained a variety characterized by the following marks: stalks light, seldom exceeding six feet in height; strong below the ears, slender above; ears containing from ten to fourteen rows, and from two to three ears to the stalk more frequently than a less number. From these facts it will be seen that a mixed variety may be produced, possessing all the desirable qualities of several old ones. But such a new variety will require attention for years, to prevent it from degenerating into one of the original sorts; after which, I think, the variety will become as permanent as any other.

Statement of JOHN EICHAR, *of Greensburg, Westmoreland county, Pennsylvania.*

Next to wheat, corn is our most valuable crop. The best mode of raising is, to plough and subsoil a clover sod late in the fall, or in February, to the depth of twelve inches, harrow thoroughly, and mark out in rows 3½ feet apart each way, drop four grains in a hill, use the cultivator twice, and double shovel-plough twice. It should be thinned out to two or three stalks in each hill, the second time of working. The greatest yield we have is 75 bushels per acre; average yield, 50 bushels of shelled corn to an acre. Cost of production, 29 cents a bushel. Smallest yield that will pay expenses, at present prices, is 29 bushels.

Statement of E. F. GILBERT, *of Matagorda, Matagorda county, Texas.*

Corn will grow indiscriminately, and in the greatest abundance, in every portion of the State, with less labor, and a more bountiful return, than, perhaps, any other part of the world. From 60 to 70 bushels per acre is an average production of the Caney and Peach Creek lands, which doubtless might be increased by a higher degree of cultivation. None is raised for transportation, as cotton and sugar pay

best. In favorable seasons, these lands average from 1½ to 2 bales of cotton, or 2 hogsheads of sugar, to the acre.

Statement of JOSEPH BOWDITCH, *of Fairfield, Franklin county, Vermont.*

This is an important crop with us, as it is universally used for food, both for man and beast. When mixed with rye or wheat, it comprises one-half of our farmers' bread. It is employed, to a small extent, for hog-feeding; but, when ground with the cob, it is more extensively used for horses and cows. Average yield, 40 bushels per acre, if twenty or thirty loads of manure is used broadcast; but if hog manure or night soil is added, by putting a small shovelful in a hill, we frequently get 70 or 80 bushels to an acre. It is only raised for home consumption. Corn-stalks are an excellent food for cows in the fall of the year, as it increases their milk.

Statement of OSMAN DEWEY, *of Barre, Washington county, Vermont.*

Corn requires a rich sandy loam, and will do well on green sward if there are twenty loads of green manure spread upon the grass before ploughing. It will do equally well after oats, with the same cultivation. I plough seven inches deep, and turn the turf over flat. I harrow it with a fine-toothed harrow until it is perfectly mellow, three inches deep; then furrow it three feet apart one way, and drop a small shovelful of compost or well rotted manure, three feet apart, in the furrows, first putting a little dirt over it, and then drop five kernels of corn in each hill and cover two inches deep with fine earth, about the 15th of May. I next put half a gill of wood-ashes to each hill, and hoe it two or three times. I harvest in September. The ordinary yield is from 50 to 110 bushels per acre.

The annual price of corn here is 75 cents per bushel; and I suppose 40 bushels per acre, at $30, would pay all expenses of cultivation.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

Corn is the crop to which we devote the most of our attention, the kinds in use being the gourd-seed and flint. Our mode of raising is to take oat or wheat land and break it well in January and February. We lay off our ground four feet wide, and plant in April, thinning it to two stalks in a place as soon as it can be drawn by the roots. We commence ploughing as soon as it is well up, and work three times before stopping, and no more. Every one adopts the plan he thinks best to destroy weeds and make his corn grow; a majority of us using the plough and hoe alone. The yield is from 15 to 40 bushels per acre, which is worth at home 50 cents, and in market from 60 to 85 cents per bushel. The cost of raising is thought to be about 37½ cents per bushel.

Statement of JAMES ARMSTRONG, *of Hartwood, Stafford county, Virginia.*

We plough our land for corn in the fall, as deep as can be done with two horses or a yoke of oxen, from six to eight inches deep, allowing it

to lie in the rough furrow until spring. Then all the manure that we have is distributed over the field and ploughed in; after which the land is marked off with furrows, four and a half feet apart, and the corn planted two feet asunder in the hills, leaving only one stalk to a hill. In the course of the summer the ground is kept loose by frequent stirring with the cultivator and hoe, and free from grass and weeds. The yield, by this management, is often 30 bushels to the acre.

Statement of JAMES DURLEY, *of Platteville, Grant county, Wisconsin.*

Corn, with us, is the principal crop. This year I think I have seen a yield as high as 60 bushels to the acre, with an average of 45 bushels. We have several varieties, the most popular of which we call "New York corn." My own experience, however, satisfies me that any variety will adapt itself in a few years to almost any climate, and the kind that has been the longest cultivated is the best

Corn should be planted in this region from the 1st to the 15th of May. It should be ploughed soon after it comes up; and the second time of ploughing, hoe and clear it of grass and weeds. After this it will bear the dirt, by which it can be kept clean till it is about two or three feet high, when it should be left to itself to continue its growth.

WHEAT.

Wheat, where the soil and climate are adapted to its growth, and the requisite attention is paid to its culture, is decidedly preferred to all other grains; and, next to maize, is the most important crop in the United States, not only on account of its general use for bread, but for its safety and convenience for exportation. It is not known to what country it is indigenous, any more than our other cultivated cereals; all of which, no doubt, have been essentially improved by man. By some, wheat is considered to have been coeval with the creation, as it is known that upwards of a thousand years before our era it was cultivated, and a superior variety had been attained. From a series of experiments, however, made by M. Esprit Fabre, an intelligent gardener at Agde, near Montpelier, in France, which have occupied some twelve or fifteen years, it has been ascertained that certain kinds, if not all of our cultivated wheats, are nothing more than peculiar forms of *Ægilops ovata*, or of *Æ. triaristata*, of which the whole coast of the Mediterranean more or less abounds. From the *Æ. ovata*, he has succeeded in producing a true wheat, (Triticum,) which, from careful cultivation in the open field for four consecutive years, has retained its form, and yields harvest like those of other wheat.

This grain has steadily followed the progress of civilization from the earliest times in all countries where it would grow. Even hostile

armies have been the instruments of its diffusion. Cortez, the inhuman conqueror of Mexico, wrote from thence to the King of Spain: "I beseech your Majesty to give orders that no vessel sail to this country without a certain quantity of plants and grain." The foundation of the wheat harvest of Mexico is said to have been three or four grains, accidentally taken by a slave of the conqueror in 1530, which he carefully cultivated and preserved; while the Spanish lady, Maria de Escobar, who first imparted the same blessing to Peru, has her name enrolled in history as the distributor of successive harvests among the Inca farmers of that country

The introduction of this grain into the North American colonies dates back to the earliest periods of their settlements by Europeans. It was first sown, with other grains, on the Elizabeth Islands, in Massachusetts, by Gosnold, at the time he explored that coast, in 1602. In 1611, wheat, as well as other grains, was also sown in Virginia, and by the year 1648 there were cultivated many hundred acres in that colony. Although premiums were offered as an encouragement of its growth in 1651, it was not much cultivated for more than a century after, in consequence of the ill-directed attention to the culture of tobacco.

Wheat and other agricultural products had been cultivated in New Netherland in considerable quantities prior to 1626, as there arrived in Holland that year from the little colony on Manhattan Island samples of the recent harvest, consisting of wheat, rye, barley, oats, buckwheat, Canary seed, beans, and flax, as an evidence of their prosperity.

According to the records of the "Governor and Company of the Massachusetts Bay, in New England," there were ordered from England, in 1629, wheat, barley, oats, rye, beans, peas, the seeds or pits of fruits, (apple, pear, quince, peach, plum, cherry, pomegranate, and filberts,) saffron, woad, liquorice, hemp, flax, potatoes, (sweet?) madder, and hop-roots, and the cuttings or plants of the currant. In 1631, there arrived at Nantasket, from England, a ship containing thirty-four hogsheads of wheat-flour, fifteen hogsheads of peas, four hogsheads of oats, besides some seed barley and rye.

Wheat was introduced into the valley of the Mississippi by the "Western Company," in 1718, where, from the careless mode of cultivating it by the early settlers, and the sudden alternations of temperature, it would only yield from five to eight-fold, running to straw and blade without filling the ear. In 1746, however, the culture had so far extended that 600 barrels of flour were received at New Orleans from the Wabash; and by the year 1750, the French of Illinois raised three times as much as they consumed, and large quantities of grain and flour were sent to the same place.

Prior to the Revolution, the primitive soils of New York, New Jersey, and New England, appear not to have rewarded the cultivation of this grain much, if any, beyond the wants of the inhabitants. Considerable quantities were raised on the Hudson, and in some parts of New Jersey and Pennsylvania, which were exported to the West Indies and New England, and to Great Britain, France, Portugal, and Spain, in the years of scarcity, previously to 1723. In 1750, New Jersey raised more wheat than any other colony.

In New Hampshire, for several years preceding 1792, Siberian wheat

produced good crops whenever the seed was renewed by fresh importations from Siberia by the way of England; otherwise, it degenerated. On the "interval lands" along Connecticut river, it yielded from 40 to 50 bushels to an acre; on common upland, about 20 bushels.

The price of wheat in New Netherland in 1635, was two florins per skepel, (60 cents per bushel;) on the river Piscataqua, in 1680, $1 25 cents per bushel.

The amount of flour exported from New York in 1749–50, was 6,721 tons, besides the grain, estimated by the bushel; in 1756, 80,000 barrels. From New Jersey, in 1751, 6,424 barrels. From Philadelphia, in 1752, 125,960 barrels, besides 86,500 bushels of wheat; in 1767, 198,516 barrels, besides 367,500 bushels of wheat; in 1771, 252,744 barrels; in 1772, 284,827 barrels; in 1784, 201,305 barrels; in 1787, 193,720 barrels; in 1791, 315,785 barrels. From Savannah, in 1771, 7,200 pounds. From Virginia, annually, for some years preceding the Revolution, 800,000 bushels of wheat. From City Point, in 1791, 10,090 barrels of flour, besides 165,635 bushels of wheat; in 1793, 28,877 barrels, besides 88,115 bushels of wheat; in 1794, 5,853 barrels, besides 31,212 bushels of wheat.

The total amount of flour exported from the United States, in 1791, was 619,681 barrels, besides 1,018,339 bushels of wheat; in 1800, 653,052 barrels, besides 26,853 bushels of wheat; in 1810, 798,431 barrels, besides 325,924 bushels of wheat.

The quantities of domestic wheat, flour, biscuit, and ship-bread, with their valuations, shipped from the United States within the last thirty-three years, are given in the following table:

Years.	Wheat.	Value.	Flour.	Value.	Biscuit or ship-bread.		Value.	Total.
	Bushels.	Dollars.	Barrels.	Dollars.	Barrels.	Kegs.	Dollars.	Dollars.
1820-21.....	25,821	20,925	1,056,119	4,298,043	47,509	31,370	157,389	4,476,357
1821-22	4,418	3,086	827,865	5,103,280	44,581	33,382	180,926	5,287,286
1822-23.....	4,272	5,663	756,702	4,962,373	43,700	36,994	183,401	5,151,437
1823-24.....	20,373	20,740	996,792	5,759,176	50,888	33,282	197,339	5,977,255
1824-25.....	17,990	18,570	813,906	4,212,127	68,627	37,873	235,982	4,466,679
1825-26.....	45,166	38,676	857,820	4,121,466	72,253	49,705	251,728	4,411,870
1826-27.....	22,182	14,800	868,492	4,420,081	59,856	44,236	210,903	4,645,784
1827-28.....	8,906	6,730	860,809	4,286,939	51,494	35,191	171,105	4,464,774
1828-29.....	4,007	6,372	837,385	5,793,651	44,254	26,849	172,897	5,972,920
1829-30.....	45,289	46,176	1,227,434	6,085,953	57,101	38,592	188,474	6,320,603
1830-31.....	408,910	523,270	1,806,529	9,938,458	67,113	46,048	250,533	10,712,261
1831-32.....	88,304	93,500	864,919	4,880,623	73,883	29,208	255,735	5,229,858
1832-33.....	32,221	29,592	955,768	5,613,010	72,642	23,718	252,555	5,895,157
1833-34.....	36,948	39,598	835,352	4,520,781	66,309	25,161	231,708	4,792,087
1834-35.....	47,762	51,405	779,396	4,394,777	59,013	36,447	221,699	4,667,881
1835-36.....	2,062	2,062	505,400	3,572,599	55,986	30,691	244,760	3,819,421
1836-37.....	17,303	27,206	318,719	2,987,269	43,308	17,606	244,292	3,258,767
1837-38.....	6,291	8,125	448,161	3,603,299	49,566	21,633	263,686	3,875,110
1838-39.....	96,325	144,191	923,151	6,925,170	68,824	41,178	349,871	7,419,232
1839-40.....	1,720,860	1,635,483	1,897,501	10,143,615	106,276	40,767	428,988	12,208,086
1840-41.....	868,585	822,881	1,515,817	7,759,646	103,995	39,410	378,041	8,960,568
1841-42.....	817,958	916,616	1,283,602	7,375,356	83,594	29,773	323,759	8,615,731
1842-43.....	311,685	264,109	811,474	3,763,073	96,572	29,351	312,232	4,339,414
1843-44.....	558,917	500,400	1,438,574	6,759,488	117,781	41,920	388,603	7,648,491
1844-45.....	389,716	336,779	1,195,230	5,398,593	117,529	30,183	366,294	6,101,666
1845-46.....	1,613,795	1,681,975	2,289,476	11,668,669	114,792	25,505	366,688	13,717,332
1846-47.....	4,399,951	6,049,350	4,382,496	26,133,811	160,980	31,082	556,266	32,739,427
1847-48.....	2,034,704	2,669,175	2,119,393	13,194,109	167,790	38,121	619,096	16,482,380
1848-49.....	1,527,531	1,756,848	2,108,013	11,280,582	111,372	21,378	364,318	13,401,748
1849-50.....	608,661	643,745	1,385,448	7,098,570	97,561	26,368	334,123	8,074,438
1850-51.....	1,026,725	1,025,732	2,202,315	10,524,331	106,399	34,815	254,286	11,804,349
1851-52.....	2,694,540	2,555,209	2,799,339	11,869,143	93,694	45,625	318,899	14,743,251
1852 53.....	3,890,141	4,354,403	2,920,918	14,783,394	121,281	56,089	454,020	19,591,817

According to the census of 1840, the wheat crop of the United States amounted to 84,823,272 bushels; of 1850, 100,485,944; showing an increase of 15,662,672 bushels. The entire crop of 1853 may be safely estimated at 110,000,000 bushels, and valued at $100,000,000.

CONDENSED CORRESPONDENCE.

Statement of ANTHONY M. HIGGINS, *of Wilmington, New Castle county, Delaware.*

Our lands are admirably adapted to the growth of wheat. The Mediterranean variety is mostly selected in consequence of its early maturity. We try to finish seeding by the 20th of September and the 10th of October, for the double purpose of avoiding the ravages of the fly, as well as to afford sufficient time to become hardened to withstand our winters, which are sometimes severe. The most certain way to insure a good crop is, to break up a clover sod in the month of August to the depth of from four to six inches. The furrow-slice should not be over eight inches in width, and carefully laid up to prevent the seed-bed from getting too hard. We let it lie in its rough state for a couple of weeks, then roll and harrow well. We drill in the seed at the rate of 1¾ to 2 bushels to the acre. It is a risk to drill less, on account of broken grains, &c. I follow my drill with a brush-drag, made by framing together four light boards, the precise width of the drill, slatted across with four slats, about six inches apart, interwoven with any kind of convenient brush. To this drag I hitch a horse, with a boy to guide him, and with it follow the drill. It covers all wheat left naked by the drill. I think, too, it has a tendency to start the wheat more quickly, and cause it to grow stronger. In this way I have succeeded in raising over 2,000 bushels of wheat on less than sixty acres of ground. I might here state that, in 1833, when I entered into possession of my estate of something less than four hundred acres, one-third of it was abandoned to gauls, gullies, sedge, and the foxes, the residue only capable of producing from 3 to 10 bushels of corn to the acre. It will now average over 40 bushels of corn, and from 20 to 30 bushels of wheat.

On Mr. James Douglas's farm, recently belonging to the Hon. John M. Clayton, a field of wheat, containing thirty acres, was treated in the following manner: guano, in the proportion of 350 pounds; plaster and common soil, well mixed alternately by the shovel; then sown daily by the hand, lengthwise and crosswise, as much as the plough could cover. The wheat was drilled early in September. Throughout the fall and winter it was the admiration of all who saw it. In February it would quite hide a rabbit, and at harvest time was so rank that it all fell flat on the ground, and had to be mown. An acre of the best of it was threshed, and yielded 53 bushels. This splendid estate of three hundred acres, ten years ago, would not have averaged 8 bushels of wheat, nor more than 20 bushels of corn; but now, 40 of the former,

and from 70 to 80 of the latter. This renovation is the result of the abundant use of lime and guano, with vegetable and animal manures.

Many grazing farmers prefer to sow their wheat on oat-stubble, as this practice secures a better grass-bed, and taxes the land less for a succession of crops.

The average yield of wheat is about 20 bushels to the acre. Price at Brandywine, $1 45 to $1 50 per bushel.

Statement of JOHN M. LESLEY, *of Danville, Vermilion county, Illinois.*

The wheat crop is beginning to fail in this vicinity, and farmers in some cases are abandoning its culture, to engage more extensively in the production of Indian corn, which is by far more valuable and productive. The usual time of sowing winter wheat is the last of August, or first of September. Prior to this, however, the soil is well broken with a plough, and loosened with a harrow. When it is sown, it is usually ploughed under, and smoothed with a harrow or brush, till the ground is made perfectly mellow. On an average, the yield of wheat is 20 bushels to the acre, bearing a price of 50 to 75 cents per bushel.

Statement of DANIEL JARRETT, *of Muncietown, Delaware county, Indiana.*

From my experience, I would say from the 1st to the 15th of September is about the proper time for sowing wheat with us. We plough the ground early enough for the stubble to become partially rotted by the time of sowing. We then sow the seed, and plough or drill it in. I consider it important that the lands should not be over 24 feet in width, in order that the open furrows may carry off the water when there may be an excess. Care should also be taken to draw other furrows in whatever direction may be necessary to facilitate the draining. This, however, depends much upon the soil. If it be open and porous, less care about draining may answer.

Statement of JOHN SPINY, *of Connersville, Fayette county, Indiana.*

The cultivation of wheat with us is on the increase. If sown late in the season, or if the fall is warm or wet, it is liable to be attacked with the "rust" the following year. Early sowing, say the last of August, on good ground well prepared, gives the best chance of a fair crop. The seed is usually harrowed in, though a light plough is sometimes used. Of late, drilling in the seed has been practised by some, and it is believed with good success. The average yield is from 15 to 35 bushels to the acre, and brings from 50 to 65 cents per bushel.

Statement of WILLIAM S. PAYNE, *of Rushville, Rush county, Indiana.*

Wheat is a sure crop in this county, except when attacked by rust. The varieties most successfully grown are the Mediterranean and Alabama, neither of which is liable to rust. We sow from the last of August

to the 15th of October, and harvest from the 25th of June until the 6th of July. The principal part of our wheat is sown among standing corn; not that it is considered the best, but the easiest plan.

Last October, I sowed some Alabama wheat on a piece of ground that had been planted in corn the spring before, turning my hogs upon it about the 1st of September. When they had done eating the corn, say by the 5th of October, I sowed my wheat broadcast on the hard ground and ploughed it in with a shovel-plough. I harvested about the 25th of the following June, when it produced 25 bushels to the acre. A neighbor of mine ploughed a piece of clover sod about the 1st of last September, and sowed it with wheat broadcast, harrowing it but once. He harvested it about the 25th of June, when it produced 27 bushels to the acre. Another of my neighbors sowed his wheat a year ago last fall on standing corn, and ploughed it in with a small plough. It produced 27 bushels to the acre, which is considered an uncommon yield.

We consider clover an excellent manure for wheat or corn; and what is still better, to pasture with hogs during the summer, and afterwards ploughing under what remains. I believe that land kept in clover two years and pastured by hogs, and cultivated with wheat and corn three years out of every five years, will keep up the fertility of our soil for all time to come.

We sow from one to one and a half bushels of wheat to the acre. The average yield without manure of any kind is not over 14 bushels to the acre. Price at our nearest market this year, 70 cents per bushel.

Statement of J. BARTLETT, *of West Lebanon, Warren county, Indiana.*

Wheat is raised to a considerable amount here, and of very good quality. Average yield, 15 bushels to the acre. The mode of cultivation is to sow in corn, or let the corn-ground lie over and fallow it the next year.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Wheat, with us, generally follows clover. The ground is thoroughly and deeply broken up, and the clover turned under in the latter part of August. About the 1st of October, it is loosened with a heavy harrow, and, if necessary, rolled, and the seed sown. It is then carefully harrowed each way. Deep and close ploughing in the breaking up of the ground is very important. We have sometimes produced more than 30 bushels to the acre, and rarely fallen below 15. The average for the last twenty years is about 20 bushels. In 1852, our crop averaged 22, and the past season it reached 24 bushels to the acre. The crop of J. H. Handy, a neighboring farmer, being taken from land of a superior quality, averaged, the past season, 34 bushels and one quart per acre. About the 1st of October, after removing his hemp crop, the seed was sown on the stubble where the hemp had grown, and ploughed in with the shovel-

plough, and then harrowed. It received no further attention until the time for harvesting.

The kind of wheat sown was the "New York premium." The old varieties of wheat seem to have lost their character, and new ones have come into use; of these, the "New York premium," and the "May," are in favor with us. Cost of production, from 45 to 50 cents per bushel, including the rent of the land. Value in the market, or in the mill, 75 cents.

The best means we have of harvesting is found in the use of the McCormick or "Virginia reaper." Two hands and three horses will cut twelve acres in a day, doing the work exceedingly well, and delivering the wheat from the machine in snug and well-formed "gavels." The grain is threshed and cleaned by the use of portable horse-power machinery.

Statement of HOWARD M. ATKINS, *of Mount Vernon, Kennebec county, Maine.*

The most common method of raising wheat in this vicinity is to sow in the spring upon corn or potato ground, which has been planted the previous season. The land is first ploughed to the depth of from five to seven inches; then harrowed two or three times before sowing, and once or twice after; and then is generally rolled. It is, also, sometimes sown upon newly broken-up ground, where the land is treated in nearly the same manner as the other, being first ploughed rather deep, say seven or eight inches, and then treated as before. The crop upon the broken-up ground is not generally so large as upon the old ground.

The average yield, I should judge, is from 10 to 15 bushels per acre. Wheat is now worth from $1 25 to $1 50 per bushel, according to quality. The kind mostly raised in this vicinity is the "red-bearded," which is considered the surest, although the "tea wheat" is grown to some extent.

There is not much manure put upon the land at the time of sowing; it is chiefly applied the year before, as upon corn and potatoes.

Statement of DANIEL FULTON, *of Bowdoinham, Lincoln county, Maine.*

For many years insects have injured our wheat, so that it has been little cultivated; but the last two years we have raised fair crops. Average yield, 15 bushels to the acre. Price, $1 25.

Statement of DAVID BRUMBAUGH, *of Marsh Run Mill, Washington county, Maryland.*

The principal varieties of wheat cultivated in this county are the "Zimmerman" and the "smooth" and "bearded Mediterranean." The latter is generally considered the surest crop, but will not yield so much to the acre as the Zimmerman, when it is not injured by the fly or other casualties. The average yield of the wheat crop of this county last season, from the best sources of information that I could obtain,

might be estimated at from 15 to 20 bushels to the acre. Market value, $1 35 per bushel. The crop was somewhat injured by the fly, late in the season, yet many parts of the county yielded much more than the estimate herein made.

The usual time for sowing wheat is from the 1st of September to the middle of October. The Mediterranean generally succeeds best by being sown early.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The best mode of cultivating wheat with us, is once ploughing, and then use the cultivator to drill in the seed. The lowest quantity of wheat per acre that will pay expenses, may be put at 8 to 10 bushels; the common yield is from 15 to 20 bushels to the acre.

Statement of WILLIAM S. MAYNARD, *of Ann Arbor, Washtenaw county, Michigan.*

Our principal crop is wheat, which is very profitably and expensively raised. The average yield this year has been 20 bushels to the acre, while 8 bushels, at present prices, would have paid expenses.

The price soon after harvest is 90 cents per bushel; average price for the last six years, 80 cents.

Statement of J. D. YERKES, *of Northville, Wayne county, Michigan.*

Wheat is the most important crop cultivated in this part of our State. The "blue-stem" is the favorite variety, giving a larger yield than any other kind, and is not so liable to rust, nor to injury from the Hessian fly; besides, it commands the highest prices.

The common mode of raising this crop, is to plough the ground in June or July, six or eight inches deep, using the cultivator and harrow to pulverize the surface, and sow about the 10th of September.

The weevil has made its appearance in some localities in this part of our State, but not in sufficient numbers to injure the crop. To guard against the Hessian fly, I know of no better remedy than to keep the ground rich. If a rank and vigorous growth can be obtained, the wheat will suffer but little injury from this fly.

The average product per acre in this vicinity, is about 24 bushels; though some farmers have obtained as high as 40 bushels to the acre.

Statement of GROVE SPENCER, *of Ypsilanti, Washtenaw county, Michigan.*

Among the crops which may be cultivated with profit here, wheat and Indian corn stand first.

The maximum yield of wheat here is about 35 bushels to the acre, and the average about 18 or 20 bushels. The smallest yield that will pay expenses, is 8 bushels to the acre, provided the price is $1 per bushel. The expense of raising a bushel of wheat is as follows, taking one acre of ground:

Interest on land one and a half years	$3 50
Once ploughing	1 00

Cultivating, sowing, and dragging	$1 00
Seed, 1½ bushels	1 50
Harvesting	1 50
Threshing	1 50
Transportation and marketing	50
	10 50
Value of straw	1 50
Product of an acre, 20 bushels	9 00
Cost per bushel	45

The best mode of raising wheat in this county is, beginning on new land, or "oak openings," to cut and burn the bushes, and then, with a strong team and plough, turn over the sod six inches deep in the summer; drag and sow the same in the early part of September following, and thoroughly drag and grub the ground before the wheat is up large enough to be injured by the operation; taking off the stumps with oxen and cart. This process, if well done, will insure a crop, of about 20 bushels per acre. As soon as the wheat is taken off, the succeeding season, and the stubble has become dry, burn over the field, plough once, and sow again the same land. In the succeeding spring sow with clover. This second crop of wheat will bring about 18 bushels to the acre. Let the land remain to clover two or three years, and then in August turn over the sod well with the plough, and early in September sow to wheat; and when that crop is harvested, burn the stubble, plough, and sow as before; seeding to clover in the following spring.

Statement of THOMAS W. SAMPSON, *of Ashland Farm, Rocheport, Boone county, Missouri.*

Wheat is rather an uncertain crop in this county, but I think it is mainly owing to the careless manner in which it is put in. It is generally sown after corn, from the first to the last of October. But our best farmers are adopting a better plan by sowing much earlier, on fallow land, where they produce much better crops. The varieties most in use, are the "smooth red chaff" and the "Iowa white," the latter of which is rather scarce, but is esteemed the best and most profitable.

Wheat, the present season, has been worth from 75 to 90 cents per bushel. Cost of transportation to St. Louis, 5 cents per bushel.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

Wheat stands next in importance to Indian corn in the list of cereals raised among us. I doubt if this crop succeeds as well here as in more northern latitudes, on account of our changeable climate. A warm day will loosen the earth, and a freeze at night and (by its irregular crystallization) expose the roots to the subsequent action of frost.

To raise a crop that is likely to be free from the rust in the spring,

and to get root sufficiently deep and strong enough to stand the winter, wheat should be sowed in September. When properly cultivated, it generally succeeds very well. I have raised a crop which I thought averaged 30 bushels to the acre. One of my neighbors informed me that his averaged 35 bushels. I have heard of 40 and 50 bushels being raised to an acre. A gentleman from St. Charles county (in which this crop is raised to a larger extent than in any other in the State) informed me that the average of that section was 20 bushels. The quality of the wheat raised in Missouri is generally very fine.

Statement of W. M. JACKSON, *of Fayette, Howard county, Missouri.*

Wheat is not extensively raised in this county, as it is not considered a certain crop. It frequently blasts and takes the rust from ten to fifteen days before maturing. This, I think, is caused by its being too thin on the ground, which causes the straw to grow very luxuriant and coarse, retaining the sap sufficiently long to produce the rust. When sufficiently thick, it seldom fails to mature well, and yields about 20 bushels to the acre, and frequently 30 bushels and upwards.

In the fall of 1848, about ten acres of my crop were sown by an inexperienced hand, with about two bushels and a peck to the acre. When it came up, I thought it would produce nothing, it was so thick. Out of sixty acres, sown with 1¼ bushels to the acre, the ten acres of thick sowing was the only good wheat I made that season, and there was a total failure in my neighborhood. I have since that time sown from one and a half to two bushels to the acre, and have generally made good crops. I have been growing wheat on the same farm for twenty-one years, and have never had any crop injured by the Hessian fly, before last year. One field, which was sown the last week in August, did not yield more than half a crop.

Wheat is mostly sown in this county on corn-ground after the corn is cut up, which is generally done the last of September or first of October. Those who raise tobacco generally sow on their tobacco land after taking off the crop. If the tobacco has been well cultivated, and the wheat well put in, a good yield will be the result. The only fertilizer we use is, to sow our land that begins to fail with red clover, which pays well, either for grazing or cutting for hay. By standing three years in clover, land that has not been very badly cultivated will produce better than it did when first cleared. I turn the clover sod under in the fall crop, plough in the spring, and lay off the rows four feet apart; as soon as up finger-length, harrow with a two-horse harrow, plough three or four times with a one-horse diamond plough, and make from 40 to 60 bushels per acre, according to the season. Last year I cultivated thirty acres in corn as above stated, cut it up and sowed broadcast in wheat the first week in October, and harrowed in, with a two-horse harrow, 1¾ bushels to the acre. The corn was ploughed the last time with the shovel-plough, which left the land in ridges and furrows; the wheat, as sown, fell in the furrows, and was there covered by the harrow as it was dragged across the ridges. It grew as though it had been drilled.

As I had been of opinion, for several years, that wheat in this county would stand the winter better in drills, I had twelve rows harrowed down smooth before sowing, and then harrowed in the same as the other, which was double the amount of labor. The result of this levelling was about 20 per cent. less; and had it not been a very favorable winter, I have no doubt but it would have been even less. This experiment induced me to buy one of Pennock's drills this fall, and put in my crop with it. It works well, and is a great labor-saving machine. I have sown widths across my fields broadcast, and ploughed and harrowed in the usual way.

All my experience in the cultivation of wheat has satisfied me that ground should be ploughed from six to eight inches deep, sufficiently early to cause all the litter and vegetable matter to rot and pulverize by the last of September or first of October. In confirmation of this, I will give an account of a casual or accidental experiment. In the summer of 1838, in order to make a new track through one of my fields, I had the oats cut the first week in July. Where the track was made, the stubble was immediately turned under with a large two-horse plough, about eight inches deep, and then harrowed, and re-ploughed about the 1st of August, and frequently harrowed in the course of that month. The last of September, I ploughed the field from six to eight inches deep, turning the stubble and grass well under, sowed the wheat, and harrowed in. From early in the spring to the cutting of the wheat, the track could be traced by the growth, and the yield on the track was more than double. I have since made similar experiments with like results. Our clover fields, when cultivated as above, generally retain a sufficiency of seed to produce a good growth of clover after the wheat is taken off; and by continuing the clover one year, to be mown or pastured, a rotation of corn and wheat may be continued without much, if any, reduction of the soil. If the corn-stalks are left on the ground, an improvement of the soil will be made, and they will prevent the soil from washing.

Statement of H. L. Brown, *of Fayette, Howard county, Missouri.*

The average product of wheat for this county, for the last year, is probably 10 or 12 bushels to the acre. Time of seeding, from the 1st of September till the last of October. Early sown wheat does much the best; as deferring the time of sowing till after tobacco is housed, renders it too late to withstand the winter frost. Time of harvesting, the last of June.

The best preparation of the soil is to turn under a crop of clover, and sow immediately, and harrow in the seed with a light plough or drill. By this method, the maximum amount of wheat that our soil will produce can be obtained, which is about 25 bushels to the acre. Our soil can be improved almost indefinitely by the use of clover—so much so, that it will not produce good wheat. If it is increased beyond the point of 25 bushels to the acre, the growth of straw will be increased, but the grain diminished, the growth of straw being too luxuriant and weak.

Statement of ARMSTRONG O'HARA, *of Saint François county, Missouri.*

Wheat is not a sure nor a profitable crop here, as the fly injures it in the fall, if early; if sown late, it is sometimes destroyed by the rust. Cost of raising, 50 cents per bushel. Market value 60 to 65 cents per bushel. Average yield, 10 bushels to the acre.

Statement of WILLIAM H. COOKE, *of Howard, Warren county, New Jersey.*

There is no guano used by us in the production of wheat. The system we generally pursue in the rotation of crops is, to let our fields lie in sod two years, then plough for corn, fallow for wheat or rye the next year, and seed down with Timothy in the fall, and with clover in the spring. We plough three times for wheat when fallow land is used, and sow 1½ bushels to the acre. The time of seeding is from the 10th to the 25th of September; and harvest commences about the 10th of July. The yield is from 12 to 15 bushels to the acre, which brings about $1 20 per bushel.

Statement of J. P. ROUNSVILLE, *of Rounsville, Alleghany county, New York.*

In growing wheat, our surest crops are produced by turning under a luxuriant growth of clover about the 10th of June, after which it is ploughed twice, and harrowed well. The ground thus prepared is sown the 1st of September with about two bushels per acre of perfect seed, which may be obtained from good wheat by throwing the grain some 40 feet, and using only that which falls the farthest off. On the 1st of March, in the following spring, 15 pounds to the acre of clover-seed may be sown, and also at this time 100 pounds of lime, with the same amount of plaster. When the kernel is two-thirds out of the milk, the wheat is harvested. Under this mode of treatment, the average yield is about 25 bushels per acre.

The cost of raising and threshing may be calculated at $10 per acre. Interest on land, $3. The price of wheat is generally $1 per bushel. The best crop in town last year was 43 bushels to the acre.

Statement of COLLINS GARDNER, *of Springwater, Livingston county, New York.*

Wheat is our principal crop. Soule's white-flint variety I consider the best adapted to our soil and climate. It grows well, ripens early, and has plump and handsome berries. The average yield may be set down at about 15 bushels to the acre. I consider the best mode of harvesting to cut as soon as the berry begins to harden; shock in round bunches of ten or twelve sheaves, with caps of two sheaves each. Clover is generally sown, and soon after plastered in the spring on winter wheat. This usually makes good pasture, and is indispensable to keep the soil in proper condition. Deep ploughing and clover will renovate our soils, and yearly increase the amount of grain.

Statement of F. W. Lay, *of Green, Monroe county, New York.*

Almost every farmer in this region has a different process of preparing the ground for wheat. The old method of summer fallowing is but little practised, excepting to clear lands from foul weeds or grass. Where land is fallowed, it is ploughed in May or June, generally eight or nine inches deep, and then using the drag or wheel cultivator as often as practicable till seeding. We generally sow from 1½ to 2 bushels per acre, between the 1st and 20th of September; and the best farmers brine, plaster, or lime their seed previous to sowing. This can easily be done by spreading the wheat-seed upon the barn floor, and sprinkling about a peck of salt to every 10 bushels of grain, throwing sufficient water upon it to dissolve the salt; after which, plaster or lime may be raked into it to dry it. This preparation on our soils I believe to be an infallible preventive of smut in the berry; and as these substances enter largely into the elements of the plant, it is thought that they add to the productiveness of the crop.

As farmers grow wiser, and adopt a more scientific rotation of crops, the yield increases. At present it may be set down at from 20 to 35 bushels per acre; though 60 bushels have been obtained in this town.

The best remedy for the Hessian fly is, to have the land in such a state of fertility that the plant will grow so rankly as not to be injured by it, which seldom occurs seriously, except upon light land and dry knolls. It gradually disappears after a hard frost.

The weevil, or wheat midge, has not been known in these parts for four years past. As our harvest is earlier than to the eastward, it is thought it will not do the same damage as in former times. Thus far its ravages have been confined to spring and late winter wheats. This readily indicates that we should sow our wheat on warm land, and adopt every method to bring the crop forward early. I notice considerable difference in their ravages in different kinds of wheat. The Mediterranean is scarcely injured at all; and generally the coarser the grain, and the thicker the chaff, the less liable it is to injury—probably because the insect in its winged state cannot insert its ovipositor through the harsh, coarse chaff of certain kinds of wheat.

Plaster is generally sown upon wheat in the spring, both as a fertilizer to the crop, and also to bring forward the clover and other grasses sown therewith. Guano and other imported manures have been tried, but have generally been found too expensive to be profitable.

Statement of James H. Watts, *of Rochester, Monroe county, New York.*

Our farmers generally sow clover as a fertilizer, and, with the use of gypsum, the land has been kept in good condition for the last thirty-five to forty years. Soule's white-flint variety is the kind generally sown, and will usually yield from 25 to 27 bushels to the acre, weighing full 60 pounds to the bushel.

Wheat is produced at a cost of 75 cents per bushel, and for the last four years has brought in market from $1 to $1 50 per bushel. Flour is manufactured here in large quantities, of an excellent quality, and is transported to Albany, via the Erie canal, in boats carrying from 600

to 800 barrels to a trip, at a cost of 32 to 65 cents per barrel; thence to the city of New York, via the Hudson river, from 8 to 15 cents per barrel. It is also taken in the winter, as well as at other seasons, via railroad, for 70 to 90 cents per barrel.

Statement of HERMAN POWERS, *of Lewiston, Niagara county, New York.*

The average crop of wheat in this portion of the State is about 25 bushels to the acre; although in many instances, from proper cultivation, the yield has been more than double. My neighbor, Mr. William Hotchkiss, who exhibited the largest yield at the World's Fair in London, in 1851, in a field of six acres, in 1849–50, averaged 63½ bushels to the acre, of wheat weighing 63 pounds to the bushel. It attracted much attention from the wheat growers of Europe, who could scarcely believe that so large a yield could be taken from an acre. There was nothing unusual in Mr. Hotchkiss's method of cultivation. He ploughed deep, taking good care to pulverize the soil well, and to intermix the top with the subsoil, subduing the grass, &c. The seed was drilled in near the end of August, two bushels to the acre of "Soule's wheat." But extraordinary as this yield was universally acknowledged to be, it was exceeded during the summer of 1853, by Mr. Thomas Powell, of this county, who averaged, on a field of seven measured acres, within a small fraction of 70 bushels to the acre—namely, 489 bushels.

This latter yield was so unusual, that I deem it proper to give the particulars of the method pursued in its cultivation. In the fall a heavy dressing of swamp muck was applied. During the winter the field was used as a yard for stock, including a flock of sheep. In May there was carted on a liberal coat of barn-yard manure, which was immediately ploughed in very deep. Up to the 15th of August it was used at night as a sheep-yard, when the field was again ploughed three times, until the soil was perfectly pulverized and thoroughly intermixed with the manure. Two bushels to the acre of "Soule's wheat" was then sown broadcast, and covered with a light plough, which completed the process. The variety known in Western New York as "Soule's wheat," is in fact no other than the very best of the Genesee "white flint," having a stiff straw and maturing early.

As the product of this soil in wheat as yet stands unprecedented, it may be useful to give the following analysis, by Professor Emmons:

Water of absorption	3.00
Organic matter	7.75
Silicates	76.93
Carbonate of lime	2.82
Phosphate of alumina	0.15
Magnesia	0.25
Peroxide of iron and alumina	8.82
	99.72

In this county it is supposed that 13 bushels of wheat to the acre

will pay all expenses of culture, and my experience teaches me that an additional outlay of 40 per cent., judiciously applied, will bring an average return of 40 bushels to the acre. Under the European system of cultivation, it could unquestionably be run up to an average of 56 and perhaps 70 bushels to the acre, as is evinced by the success of Messrs. Hotchkiss and Powell.

It can scarcely be necessary to caution the experienced and enlightened farmer as to the careful selection of his seed. Threshing wheat by machines should be avoided, as the grain is frequently crushed and the germinating principle greatly injured or destroyed. It should be well cleaned, of course, and chess and other noxious seeds excluded as much as possible by repeated screening. These seeds sometimes get buried deep and lie dormant for years, until the plough, by accident, brings them under the influence of the sun, when they germinate and mysteriously show themselves, to the vexation of the husbandman.

It has been found beneficial, also, to change the seed by selecting it from different localities every three or four years. Between the middle of August and first of September is found to be the most proper time for sowing wheat, and deep ploughing is deemed almost indispensable for a good crop.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Wheat is harvested with us about as soon as the berry gets hard enough to be worked into dough in the hands. A great part of this grain in our county is cut with the reaper. This implement continues to give great satisfaction, and works well upon smooth and level lands. It cannot be used where it is very hilly, nor among large stones or stumps, nor where the grain has fallen into whorls; but in lodged grain, which all lies in one direction, it works better than the cradle. Our mode of shocking grain is to set it in rows two sheaves abreast, which is thought to be the best. It allows the sun to come to the sheaves, and heavy rains to run off. Our grain seldom, if ever, sprouts or grows in the shock. Some have tried round shocks with caps, but the other form is generally preferred. In storing or housing wheat, we never, if we can avoid it, store it away upon a partly filled hay-mow, especially if the hay is new, for the wheat in that condition takes the steam from the hay, which makes it musty and disagreeable; but far greater damages are often sustained by bad stacking. I have seen a great deal of good wheat destroyed by unskilful stacking. The midge, or weevil, has done a great deal of damage to our white wheat. The only remedy that we have discovered is, to try every means to get the crop matured as early as possible. With that object we sow early and thick, upon the dryest and richest land, and cultivate the soil to a very fine tilth. The Hessian fly has not for many years done us any injury.

The expense of raising an acre of wheat may be estimated about as follows:

Ploughing once	$1 38
Cultivating once and harrowing twice	2 28
Seed, 1½ bushels	1 50

Sowing the same	$0 13
Cutting and binding	1 50
Threshing 20 bushels, at 8 cents per bushel	1 60
Conveyance to market, 2 cents per bushel	40
Total	8 79

The above sum divided by 20, which is an average number of bushels raised per acre, and we have 44 cents per bushel as the expense of raising wheat in this county. It costs about 12 cents per bushel to send wheat to New York via the Erie canal.

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

When pasture land is sown with wheat, we plough it in the summer, which gives the sod and roots time to rot. In September cross-plough and manure it. From the 10th to the 20th, sow it broadcast, about one or one and a half bushels to the acre. Harrow it in about two inches deep.

Supposing the field to be in pasture, we adopt the following rotation of crops: The first year we plant it with corn; the second, sow with oats, barley, or peas, in April or May; then in August or September plough, and sow it with wheat or rye, seeding it down with clover. In the following, or third year, in July or August, we gather the grain, and the three succeeding years let the field remain in pasture, or grass, for hay.

Do not rely upon the statements you see in the papers of a large number of bushels of wheat grown to the acre in this State, more especially in the eastern part. These accounts in themselves are strictly true, but the whole truth in regard to them should be told. A few acres only, in such cases, are devoted to wheat, of the best quality, under the highest state of cultivation, manured to its utmost capacity with the kinds of fertilizers best adapted to the soil—every possible care taken with it; and it would be most extraordinary if a large yield should not be the result. Few only of our farmers can thus afford to cultivate their lands; and the average yield of wheat per acre cannot be determined from such hot-bed crops. No one can calculate with any certainty the average yield. It depends upon the quality of the soil, and the care and attention given in preparing and manuring the land. Deep snows, cold winters, and wet springs in this climate, are more favorable to the growth of wheat, than an open winter and a dry spring. When the ground is covered with snow which remains until spring, but little of the grain is winter-killed If the months of May and June are wet, the growth is large, and the yield abundant; but an open winter, with dry weather in April and May, is injurious.

Guano is not used to much extent in the production of this grain. A few of the wealthy farmers have used it with great benefit; they speak highly of it, and say it is well adapted to wet lands, causing so large a growth of the plant in the fall of the year, as to give the roots a firm hold of the soil, and thus prevent them from being winter-killed. Wheat,

in this county is raised only on the best of the land; other crops are much more certain on poorer soils, and are quite as profitable.

The raising of wheat has received a severe shock in this county, owing to the great demand for rye-straw for the manufacture of paper. The price has risen to an alarming extent. Incredible as it may seem, rye-straw found a ready sale at $14 per ton in this county the past year, and in great demand at that. The immense amount of paper used will keep the price of straw at a high rate, until the Western States enter largely into the manufacture of paper.

The Hessian fly and weevil, of late years, have not to any great extent injured the grain in this county. I do not know of any remedy for them. The farmers, for a while, quit raising wheat; these insects do not materially injure the rye.

Timothy is now sown with wheat, immediately after harrowing it in; the ground is better fitted for it, being moist and soft. The cool weather in autumn is favorable to its growth, which is much more certain than when sown in the spring. Clover, however, is sometimes sown in the spring, in March or April. When a field is seeded down, the practice is to pasture it the first year, and mow it the second and third. By pasturing it the first year, the clover is lessened in amount, and the grass gets a liberal growth so as to root out the clover, in a measure, the second or third year. The price of wheat for the last sixty years, at Albany and Troy, will be seen by the following table, which is the amount per bushel as claimed and received by the Van Rensselaers for wheat rents on their lease lands. The table is in shillings and pence, eight shillings being a dollar. The prices of fowls will show the value of poultry, and the price of days' work the cost of a team per day, with a driver:

January 1, 1793, 1 bushel of wheat was valued at	6*s.*	0*d.*,	4 fowls at	4*s.*,	1 day's service at	10*s.*	
Do.... 1794	do	do	8	0	do	do	
Do.... 1795	do	do	11	0	do	do	
Do.... 1796	do	do	16	0	do	do	
Do.... 1797	do	do	12	0	do	do	
Do.... 1798	do	do	10	0	do	do	
Do.... 1799	do	do	9	6	do	do	
Do.... 1800	do	do	12	6	do	1 day's service at	14*s.*
Do.... 1801	do	do	14	6	do	do	
Do.... 1802	do	do	8	0	do	do	
Do.... 1803	do	do	9	0	do	do	
Do.... 1804	do	do	10	0	do	do	
Do.... 1805	do	do	16	0	do	do	
Do.... 1806	do	do	11	6	do	do	
Do.... 1807	do	do	11	0	do	do	
Do.... 1809	do	do	8	0	do	do	
Do.... 1810	do	do	12	6	do	do	
Do.... 1811	do	do	14	0	do	do	
Do.... 1812	do	do	15	0	do	do	
Do.... 1813	do	do	18	0	do	1 day's service at	16*s.*
Do.... 1814	do	do	15	0	4 fowls at 6*s.*	do	
Do.... 1815	do	do	13	0	do	do	
Do.... 1816	do	do	14	0	do	do	
Do.... 1817	do	do	18	0	do	do	
Do.... 1818	do	do	15	0	do	do	
Do.... 1819	do	do	14	0	do	do	
Do.... 1820	do	do	8	0	do	do	
Do.... 1821	do	do	6	0	4 fowls at 4*s.*	do	
Do.... 1822	do	do	9	0	do	do	

January 1, 1823, 1 bushel of wheat was valued at 10*s.* 0*d.*, 4 fowls at 4*s.*, 1 day's service at 16*s.*

Do	1824	do	do	10	0	do	do	
Do	1825	do	do	8	0	do	do	
Do	1826	do	do	7	0	do	do	
Do	1827	do	do	8	0	do	do	
Do	1828	do	do	8	0	do	do	
Do	1829	do	do	14	0	do	do	
Do	1830	do	do	8	0	do	do	
Do	1831	do	do	10	0	do	do	
Do	1832	do	do	10	0	do	do	
Do	1833	do	do	10	0	do	do	
Do	1834	do	do	8	0	do	do	
Do	1835	do	do	8	0	do	do	
Do	1836	do	do	12	0	do	do	
Do	1837	do	do	18	0	4 fowls at 6*s.*	do	
Do	1838	do	do	13	0	do	do	
Do	1839	do	do	14	0	do	do	
Do	1840	do	do	9	0	do	do	
Do	1841	do	do	8	0	4 fowls at 4*s.*	do	
Do	1842	do	do	10	0	do	do	
Do	1843	do	do	7	0	do	do	
Do	1844	do	do	8	0	do	do	
Do	1845	do	do	8	0	do	do	
Do	1846	do	do	9	0	do	do	
Do	1847	do	do	9	0	do	do	
Do	1848	do	do	10	0	do	do	
Do	1849	do	do	9	0	do	do	
Do	1850	do	do	9	0	do	do	
Do	1851	do	do	9	0	do	do	
Do	1852	do	do	8	0	4 fowls at 4*s.*	do	
Do	1853	do	do	9	0	do	do	

I cannot give anything like the average yield of wheat in this county; but will say, from 8 to 30 bushels per acre can be raised, depending entirely upon the soil and season, and the attention paid to preparing and manuring the land.

Statement of JOHN B. YOUNG *and* JAMES DE MOTT, *of Ovid, Seneca county, New York.*

The cost of raising various crops must necessarily depend much on the price of labor. In 1848, the estimated cost in labor to raise an acre of wheat, was $10. The following is estimated to cover all expenses, including interest, on land yielding 20 bushels of wheat per acre:

Cost of ploughing first time	$1 25
Cost of ploughing second time	1 00
Cost of ploughing third time, or its equivalent by cultivator	1 00
Harrowing three times, at 38 cents each time	1 14
Drilling in	50
Cradling and putting in shock	75
Housing or stacking	30
Threshing twenty bushels, 8 cents per bushel	1 60
Conveyance to market	50
Seed-wheat, 1½ bushels, at $1 per bushel	1 50
Interest on value of land at $50	3 50
	13 04

Twenty bushels of wheat in market, at $1	$20 00
Cost of production as above	13 04
Profit per acre	6 96

Twenty bushels is the estimated average yield per acre for this county; but on our best wheat lands, and with the above course of tillage, it will average much higher, very often reaching 40 bushels per acre under favorable circumstances.

The crop is generally cut (as it should be) a little while before it is fully ripe, raked, bound, and put into "stouts," twelve sheaves in the stout, and there left until it is fully cured, when it is either housed or stacked, and threshed out as soon as can be conveniently done. The straw is carefully stacked for the use of stock, and the wheat is taken to market.

The wheat crop was less with us than an average last season, in consequence of injury by the weevil, an evil for which there has not yet been discovered a remedy. It has been stated that those varieties which are least liable to injury from the Hessian fly by early sowing, are those that mature early, and are cultivated on fields that are elevated or ridgy, for the reason, as it seems, that the crop is more agitated by the winds, and the insect, in consequence, prevented from remaining on the head to deposite the larvæ; but these are only preventives to a limited extent, and not remedies.

Statement of JOHN HURLBUT, *of Arkport, Steuben county, New York.*

Of wheat, the Soule variety takes the preference. It will yield with us at least five bushels per acre more than any other. After several years' experience, I am fully prepared to say that we obtain better crops when the ground has produced a crop of corn the previous summer, than when it has been "summer fallowed." The following is the mode of culture we adopt: as soon as the corn is glazed we cut it up, putting thirteen rows together, carrying six from each side, and set them on the middle row. We put twenty-six hills together, and bind a few stalks firmly round the top. One man will cut and set up an acre a day in this manner. We next gather the pumpkins, and immediately start the plough; then sow two bushels of seed-wheat to the acre on the furrow, and harrow twice. After the corn is husked, the stalks should be bound in small bundles and set up on the sown wheat field, as this allows the teams to pass, in gathering them up, on the strip not ploughed, and saves driving on the wheat. The land on which the shocks stood can then be sown. No fears need be entertained about its ripening uneven.

On a field of 7½ acres, treated in the manner we have just described, we harvested the past summer 265 bushels of wheat, worth $1 50 per bushel.

Statement of JOSHUA HARRIS, *of Welche's Mills, Cabarras county, North Carolina.*

I received in December, 1851, a small amount of wheat grown by Mr. James Code, of Maryland, which I sowed the next day on good

land, but too late for a fair crop. I had one peck of wheat, however, which I sowed on the 15th of October, 1852, and harvested from it, on the 17th of June, 6½ bushels of good plump grain. Three bushels of that product I sowed on good land, on the 7th, 18th, and 19th of October. The other 3½ bushels I let out to my neighbors, and I hope by my next I will be able to make a good report.

The last crop of wheat fell very short of an average, as most of the farmers have been so taken up in picking their cotton, that they neglected sowing in good time until the weather became very wet, many of them being under the necessity of giving it up altogether, and what had been seeded was too thin on the ground.

Flour in our nearest market is worth only $5 per barrel.

Statement of SANTARRILLI S. G. FRANKLIN, *of Cuba, Clinton county, Ohio.*

Wheat, in this region, is raised to a considerable extent. The average yield is about 15 bushels to the acre; though some, by slovenly cultivation, get less than 10 bushels, while others, by deep ploughing and thorough harrowing, obtain 30 bushels to the acre. The time of sowing here is from the 10th of September to the 1st of October. I prefer sowing about the 1st of September, to avoid the rust.

The average price of wheat here is 60 cents per bushel; present price, 70 cents.

Statement of LUTHER BAILEY, *of the United Society of Shakers, North Union, Cuyahoga county, Ohio.*

Our soil is generally stiff and clayey, and not well adapted for agricultural purposes without draining. For wheat, we select from our poorest pastures or meadows a field, which we first plough in the fall. In June or July following, it is cross-ploughed, and thoroughly harrowed, and again ploughed into ridges a rod wide, just before seeding, in order to allow the water to run off freely. While this is going on, the manure from the yard is hauled on and spread broadcast, and the wheat and grass-seed sown immediately, and harrowed in about the last of August. Early sowing gives the grass a start, and the wheat is not so liable to rust.

Red clover and Timothy are the kinds of grass-seeds we sow with the wheat, at the rate of about eight quarts of the former or three of the latter to an acre. We think it is not a good practice to sow the two on the same ground, as they do not ripen together.

The "blue-stem" variety is generally preferred in this vicinity, as it is the least liable to rust, stands the winter well, and makes the most and the whitest flour. We prepare our seed-wheat by putting several bushels into a box of a suitable size, pour on water, and stir it up with a shovel until the grain is thoroughly wet. Then sprinkle on a sufficient quantity of air-slacked lime to give the wheat a good coating, and shovel it over as before. Thus treated, the wheat is sown broadcast, at the rate of two bushels to the acre. The average yield is about 30 bushels to the acre.

Statement of JOHN W. EVANS, *of Scio, Harrison county, Ohio.*

The usual average product of wheat per acre in this region is from 15 to 25 bushels, although 35 bushels are often raised; the time of seeding, from the 1st to the 20th of September, but some sow still later. The time of harvesting commences generally from the 1st to the 10th of July, and continues some three weeks. The quantity of seed sown to the acre is from one to two bushels—generally 1½ bushels. The varieties which have proved most successful are Soule's garden and the white velvet wheat.

Statement of JACOB KNOOP, *of Elizabeth, Miami county, Ohio.*

Wheat is generally sown with us in September, about 1½ bushels to the acre, and generally succeeds some other crop. We use no fertilizers, except barn-yard manure, which is spread on the land and ploughed under previous to sowing. The low price of this grain for some years past, has lessened the amount raised; but if the present prices should be sustained, more attention will be given to its culture. The kinds usually raised are the "Mediterranean," "Starbuck," and the "Select."

The price of wheat at this time is $1 08 per bushel. The crop is liable to be much injured by the frosts of winter, the Hessian fly, and the midge. The average crop is about 15 bushels to the acre.

Statement of P. W. GILLETT, *of Astoria, Clatsop county, Oregon.*

There is but a very small quantity of wheat grown in this county, as almost its entire surface is covered with a heavy growth of timber. But sufficient wheat has been grown to convince farmers that our climate and soil are well adapted to its successful growth.

Corn cannot be grown in this climate in sufficient quantities to make its cultivation any object. Our summers are too cool for the ordinary varieties.

Oats do remarkably well with us. They are generally cultivated in the usual way, but without manure. I have counted five hundred perfect grains of oats upon a single head, the stem of which was eight feet high. They are usually worth from $1 25 to $1 50 per bushel.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

The plan of wheat-growing here is simple; the ground, if fallow, is ploughed up in August, which is the first rainy season, lasting through September. The second rainy season is in February, at which time it is pleasant. The ground being ploughed, the wheat is sown, and harrowed in, most frequently, with the cragged bough of a forest oak.

The crops are not infested, while growing, by insects, the stalks and blades being clean, and emit a pleasant smell, instead of rust. Of late years, the smut has injured the grain in parts of the valley, and some endeavors have been and are making to obviate the calamity. As to the

true cause, it baffles our wisdom. Some are soaking the seed in alkali, others in sulphate of copper. It is found that smutty grains, in company with those which were originally clean, will impregnate as far as the smut of those grains reach. This season wheat is worth $2 50 per bushel. The yield is from forty to sixty-fold.

Statement of H. A. CASE, *of Troy, Bradford county, Pennsylvania.*

Soule's variety of wheat is the great favorite here, but many other kinds are sown. It is considered a much surer crop, though not producing so good flour, nor is it of so good a quality as the "white-flint," "red-chaff," or "blue-stem." It is generally raised on lands that have lain in clover, or have been fed with sheep, or used for the purposes of the dairy. The land is generally summer fallowed in June or July, cross-ploughed, and sown about the 1st of September, with from 1¼ to 2 bushels of seed to the acre. It is frequently rolled with plaster or lime, and then sown by hand. Very good crops have been raised here of late years on oat or corn-stubble, sowing about the 20th of September. The average yield on old land is about 15 bushels, and on new land 25 bushels, to the acre. The average price is about $1 per bushel. As yet, we have not been troubled with the weevil nor the Hessian fly to much extent. I think late sowing prevents their ravages.

Spring wheat is not much cultivated here. When sown in March or April, on good ground well prepared, with about 2½ bushels of seed to the acre, the yield is from 20 to 25 bushels to the acre. We use strong brine to take the foul seeds out of the wheat sown.

The average price for the last ten years is 87½ cents per bushel.

Statement of ISAAC R. EVANS, *of Harrisville, Butler county, Pennsylvania.*

Wheat is raised here as the most suitable crop, as well as the most valuable. The average product per acre is rather low, say about 12 bushels where well cultivated, on common fallow land; but 40 bushels to the acre were raised in this county in 1852 by several men whom I know. The time of seeding with us is from the 1st to the 20th of September. There is no preparation used for the seed except selecting good clean wheat of the Mediterranean or blue-stem variety, and sowing 1¼ to 1½ bushels to the acre. The yield is increasing under improved culture.

The market price of wheat this year may be set down at $1 10 to $1 15 per bushel, while in 1852 it was but 62½ cents.

Statement of H. N. MCALLISTER, GEORGE BUCHANAN, JAMES ALEXANDER, J. K. SHOEMAKER, *and* WILLIAM J. WARING, *being that portion of their report which relates to wheat on the "Oakwood Farm," near Bellefonte, to the Centre County Agricultural Society, Pennsylvania, as the result of their personal experience and observation.*

For wheat, our corn-fields are ploughed the following year sufficiently deep to throw up to the surface the manure and a portion of the pulverized subsoil. This is done either in May or June, before hay har-

vest, or in July and August, after grain harvest. When ploughed before harvest, we have to harrow and plough, and harrow again, before seeding. When not ploughed until after harvest, we plough but once, using the harrow and the two-horse cultivator to pulverize the ground and keep it clear of grass. When the season happens to be favorable for ploughing and vegetation immediately after harvest, the late ploughing is decidedly preferable, as the fresh earth, which is enriched by the manure turned under for the corn, is then thrown up and left upon the surface for the wheat crop, and the seeds of noxious weeds and grasses germinate, and are destroyed by the harrow and cultivator in mellowing the ground preparatory to seeding.

The grain drill is in very general use among our best farmers, and is supposed to have increased the general average of our wheat crop. One bushel and a half is generally sown by the drill to the acre, and is esteemed quite equal to 1¾ bushels sown broadcast. A large wooden roller immediately precedes the drill. When the ground is rough, it is thus pulverized. If very loose, it is rendered more compact, and the grain in both cases is deposited at a more uniform depth. Timothy seed is sown after the drill, and clover seed the following March. Farmers who raise oats, generally turn down the corn-stubble in the spring, and sow their wheat in the fall upon the oat stubble. When manure is so abundant as to allow a dressing for the oat-stubble prior to ploughing for wheat, this course may be pursued to advantage. Many farmers, however, reserve all the manure of the year for the oat-stubble, by which they probably lose as much in the corn crop as they gain in the oats, while they gradually impoverish their land.

Our best farmers average from 20 to 30 bushels of wheat to the acre. For the last three years, Oakwood has produced an average of 20 bushels, and we are informed that as high as 40 bushels have been produced on lots in other parts of the county, although the general average of our valley does not probably exceed 15 bushels.

The "white blue-stem" variety has for several years been generally cultivated and preferred. Last season, owing principally to the severe drought in June, it suffered considerably, in common with all other white wheats, from the ravages of the fly, while the Mediterranean almost wholly escaped. This circumstance induced many of our farmers last fall to sow more of the Mediterranean and less of the white blue-stem.

When the young clover is killed by the drought, or when for any reason there is a failure of clover and Timothy, the wheat-stubble is frequently turned under in August and sown in Mediterranean wheat or rye, in order to supply the loss of the clover crop as speedily as possible. If the land is in very good condition, and especially if a coating of manure can be afforded, Mediterranean wheat succeeds well; under other circumstances rye is preferred.

The cost of transporting by canal a bushel of wheat to Philadelphia, including storage, is about 20 cents. The market value of wheat, therefore, in Bellefonte, is about 20 cents less than in Philadelphia. All our surplus corn and other coarse grain find a ready market at home, to iron-masters and lumbermen, at prices almost equal to what they would command in the Atlantic cities.

Statement of H. J. BEYERLE, *of Sugar Valley, Clinton county, Pennsylvania.*

Plaster is extensively used, chiefly on corn and clover crops. Barn-yard manure is used, as a matter of course; but being exposed all the year round to the rain and sunshine, and heaped frequently on sloping ground, so that the rains drain it of nearly every particle of its animal ingredients, and the sun exhausting it of every atom of its ammonia, it generally arrives on the land in such an impoverished condition that it is far from having the effect that well-preserved manure would have. Were it not for this waste of manure, and the effects of what I consider a bad system of rotation, this valley could compete with any other section of country in the production of wheat; yet, as badly as farming is carried on, we raise from 25 to 30 bushels to the acre, and this of the very finest quality. The "white blue-stem" is generally sown, from a bushel to a bushel and a half per acre.

The rotation most advantageously practised here is clover, corn, wheat, and clover. Many farmers, however, raise two crops of wheat in succession, or follow wheat by rye or oats. The Hessian fly had never prevailed here to much extent; last year it was more destructive than ever before; but the damage it has done was not to be compared with its ravages in surrounding valleys. We are not troubled with the weevil, smut, nor the curculio.

Statement of PETER GROSS, *of Schnecksville, Lehigh county, Pennsylvania.*

Wheat is raised to considerable extent in our county, a large portion of our lands being well adapted to its culture. We use no guano, but depend mostly upon barn-yard manure and clover, which are our best fertilizers, though lime is employed with good results. We generally plough twice for this crop, and are beginning to use the "drill," as it prevents winter-killing, and is also a saving of seed, which it buries at a uniform depth. The variety of wheat sown is the "Mediterranean," which, in general, succeeds better than the other sorts, as it ripens early, and usually escapes the "rust." The only remedy against the Hessian fly is late sowing. The average yield is from 15 to 20 bushels to the acre.

Statement of H. D. MAIZE, *of New Berlin, Union county, Pennsylvania.*

The crop which can be raised to the best advantage in our section of country is wheat. Various modes of cultivating it are adopted, and all with success; perhaps the best is to fallow the land in June, and plough and cultivate it afterwards, so as to destroy all noxious grass and seeds; then drill in the seed about the 20th of September. The maximum yield is from 35 to 40 bushels to an acre; the average, about 20; and the smallest yield that will pay expenses, about 10 bushels to the acre. Clover is generally cultivated for the purpose of ploughing under as a manure.

Wheat is now worth in this region $1 40 per bushel.

Statement of JOHN EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

The best mode of raising wheat is, to break up a clover sod, 8 or 10 inches deep, about the 1st of September, harrow it until it becomes thoroughly pulverized, and drill in the seed from the 10th to the last of the same month; if white wheat, drill five pecks to the acre; if Mediterranean, six pecks. By this method we get at least five bushels to the acre more than by sowing broadcast. Greatest yield when drilled, 35 bushels per acre; average yield, 25 bushels. Cost of raising a bushel of wheat on good land, including manure, labor, and interest on land, 62 cents. Smallest yield that will pay expenses, when wheat is worth $1 per bushel, 15½ bushels to the acre.

The general mode of harvesting wheat is to cut with the cradle; two men follow each cradler, and rake and bind it up, and afterwards put it into shocks of ten or twelve sheaves each, leaving it on the field five or six days; it is then drawn to the barn, and threshed when convenient. Some few farmers cut their grain with reapers, which, on level or slightly rolling ground, do very well.

Statement of OSMAN DEWEY, *of Barre, Washington county, Vermont.*

Wheat is not raised with us on meadow or low land, on account of the weevil, but on high land, with an inclination to the north or west. It is a sure crop after corn, and will yield from 15 to 40 bushels per acre. It is worth from $1 to $1 50 per bushel; and 15 bushels will pay the expenses of an acre. We sow as early in April as the land will do to work. We usually plough in the fall, and sow in the spring; seeding it down at the same time with eight quarts of Timothy to an acre; or six quarts, with four to six pounds of clover to the acre.

Statement of DARIUS BLAKE, *of Woodstock, Windsor county, Vermont.*

Wheat-growing is not considered a very sure crop in this region. It is not only killed by the severity of our winters, but we cannot always get a good yield. Last year I moved off my corn from a field of three acres, ploughed and sowed upon it four bushels of blue-stem wheat, and on the 18th of September harrowed and rolled it well—washing and liming the wheat-seed before sowing. On the 25th of July last I harvested, and threshed in September, 90 bushels of good wheat, one acre of which produced 35 bushels. The product brought in market $1 50 per bushel.

Statement of CHARLES YANCY, *of Buckingham Court House, Virginia.*

This State is blessed with more than an average crop of wheat, and the quality good. The success in this region is attributed to the general use of guano, together with a favorable season, exempt from mildew and rust. Our farmers in choosing their seed-wheat are governed by two considerations, namely: early maturity and a strong bright straw; for, when early ripe, it is freer from the attacks of insects, and a strong straw is not so liable to lodge or fall. The Mediterranean va-

riety has had its day from the impression that it was fly-proof from its early maturity, but has lost favor among our millers from its dark grain. It is also subject to fall when sown upon good land, and is otherwise objectionable from its beard, which renders its chaff unfit for the food of stock; and, like all bearded wheats, it is more liable to shatter and waste in hauling or handling. The "blue-stem," or more properly the "Polish wheat," is now in general favor among us. Spring wheat has been tried, but is not adapted to our climate.

The price of wheat here, the last few months, has varied from $1 to $1 55 per bushel.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

This crop has not been very profitable for several years past; owing, as I think, to an exhausted soil, late sowing, and carelessness in putting it in. The time of sowing was formerly from the 1st of October to the 15th of December, on corn land, with little or no preparation. The average yearly yield for the last twelve or fifteen years has not been more than 10 bushels per acre, with a perceptible tendency downwards. This miserable state of affairs, I am happy to say, is beginning to surrender to the many improvements of the age, and our farmers are opening their eyes to their better interest. We are beginning to see the importance of deep ploughing, clean and sound grain for seed, and forward sowing. We now see that corn land is not suitable for wheat, and that clover or oat land is far preferable. This should be turned to the deph of 9 or 10 inches in August, while the stubble and other valuable growths are yet green, as their enriching properties are more valuable, and act upon the soil quicker in a green state than when dry. Wheat should invariably be sown in the month of September, which gives the young and tender roots time to strike so deep in the ground as to prevent their being killed by cold. One ploughing, if done in a manner to break the sod ground thoroughly, and turn all the stubble and other stuff completely under, is all-sufficient.

Before sowing, the seed should be well washed in water, (bluestone I believe to be entirely useless,) so as to deprive it of all small and unsound grains, and leave none to be sown but the pure and undefiled seed. The wheat should then, while partially wet, be rolled in strong lime or ashes, and sown while in this condition, after which it should be harrowed in. Every particle of land where the least dampness appears should be thoroughly drained with blind ditches. I believe this course, when regularly and uniformly pursued, will improve the land, produce more and better grain, and will eventually destroy both smut and rust. Our farmers differ as to the amount to be sown to an acre, but a majority of them agree that one bushel per acre, on upland, and one and a half on bottom land, is as near right as we can get. The yield is now on the increase. Average price at home, 75 cents; at market, about $1 12½.

The kinds of wheat in use are the English bearded, golden chaff, and white-flint. All others have been thrown in the shade. The first is thought to be the most sure crop, while the last two are believed to yield the

largest amount, and make the best flour. The only remedy I know for the weevil is early threshing and grinding. Time of harvest from the 20th of June to the 10th of July.

Statement of JAMES ARMSTRONG, *of Hartwood, Stafford county, Virginia.*

After the corn is removed from the land in the fall, the ground is ploughed as deep as can be done with two horses, say eight inches; then harrowed to prevent the wheat from coming up in rows. It is sown broadcast at the rate of a bushel or a little more to the acre, harrowed in, and yields about six bushels to the acre.

The varieties of wheat most esteemed here are the Poland and the blue-stem; the latter of which, I believe, is fast supplanting all others. Guano, which is generally used on a part of the land, is applied broadcast, 200 pounds to the acre, and usually doubles the crop.

Timothy and clover are sown separately on the same ground, or with the wheat, and are cut as hay or grazed for two years.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

The timbered sections of our county uniformly produce good crops of winter wheat, the average yield being, probably, not less than 25 bushels to the acre. The "oak openings" also produce this amount in favorable seasons; but the crop on this description of land is much more precarious, the cold winds of winter and early spring frequently destroying the entire crop; and finally, repeated failures have caused its entire abandonment by the farmers of the prairie. And yet, I have known some good yields of winter grain on prairie soil; such generally followed the first breaking up of the land, and were protected by a good coating of snow during the winter.

My own observation has led me to believe that the evil of winter-killing is caused more by the high, cold winds sweeping over the unprotected surface of the ground, than by the frost or cold itself. The prevailing winds here blow from the west or northwest. I have repeatedly observed that in a field of badly winter-killed wheat, such plants as were left uninjured were invariably protected from the west wind, either by a stump, stone, root, or rough furrow which the drag had failed to level down. These plants had undoubtedly been exposed to the same degree of cold as those which were killed. Along the fences, on the west and north ends of the fields, also, it is very rare to see the grain as badly injured as in the other portions, generally a strip of 10 to 15 feet being comparatively uninjured.

This remark has led many of our farmers to the conclusion that good winter wheat might be raised on exposed lands if a covering could be provided that would shelter the plants from the injurious effects of the winter winds. Accordingly, they have tried the experiment of spreading straw over the crop, either immediately after it is put in, or at any time in the fall or early winter; and this process, so far as I have heard, has invariably been attended with success—the crop being, it is confidently asserted, increased by the additional moisture and softness im-

parted to the soil by the operation. I have no doubt but this method will be found valuable in all countries, which, like this, are exposed to intense cold winds, without a protecting coat of snow. During winter, we either have no snow, or seldom more than a few inches.

The usual time for sowing fall wheat is from the 20th of August to the 15th of September. By sowing thus early, the plant is found to stand the winter better than if sown later.

A valuable kind of winter wheat, called the "Soule," has been recently introduced here by the Hon. J. B. Macy, who raised the past season 910 bushels on twenty-eight acres, or 37½ bushels to the acre. It sold for $1 per bushel.

Spring wheat raising is uniformly successful over the whole county, the yield ranging from 16 to 35 bushels to the acre. The "Rio Grande" and "Canada Club" varieties are considered the most valuable, although large quantities of "Hedgerow" and "Black Sea" are still raised. The practice is to sow as early as possible, by which the risk of the plant rusting is greatly lessened.

Wheat, both spring and winter, has yielded largely this year, and has been secured in the best possible condition, the weather proving highly favorable. The average product, all over the county, was probably not less than 18 or 20 bushels to the acre. The price this fall has been, at Fond du Lac, from 62½ to 88 cents, which is at least 25 per cent. better than for many years past.

Statement of JAMES DURLEY, *of Platteville, Grant county, Wisconsin:*

Last winter was unusually mild, and our winter wheat turned out about 20 bushels to the acre; spring wheat about the same. Fall or winter wheat is most successfully raised by sowing among Indian corn, as the dead stalks protect it from the winds in standing in the field during winter, when unprotected by snow. The great difficulty with us is to prevent it from winter-killing; if not winter-killed, it generally produces a good crop, say 20 bushels to the acre.

We have lately had a new variety of spring wheat introduced among us, which bids fair to supersede all others. It is called here "Park wheat." This year and last it produced a good crop, and entirely escaped all enemies, being ten days earlier than any other kind in the county. The grain, to all appearance, was equal to good fall wheat.

Statement of J. A. CARPENTER, *of Waukesha, Waukesha county, Wisconsin.*

Wheat, formerly, was the staple crop here; but of late, less is sown. Farming is more mixed in its character, owing to a partial failure in the wheat crops, which brought in market only from 30 to 50 cents per bushel. Last season we were more successful in its growth, the yield being from 20 to 40 bushels to the acre, and the price from 80 cents to $1 10 per bushel.

RYE.

It is not known with certainty to what country rye owes its origin. It was supposed that it had been found wild upon the Caspian Caucasian desert; but more recent observations have shown that this wild plant is different from the cultivated varieties, particularly in leaving the central stem of the ear so brittle that it cannot be threshed. A wild rye is also found in Sicily; but this, too, has characteristics by which it differs from the cultivated kind. Yet we do not know with certainty whether the parent of this plant has totally vanished, or has become so altered by cultivation in the course of time, that we cannot recognise it in the species to which it actually does owe its origin. It has been cultivated in the north of Europe and Asia from time immemorial, where it constitutes an important article of human subsistence, being generally mixed with the flour of barley and wheat. Its introduction into Western Europe is of comparatively recent date, as no mention is made of it in the "Ortus Sanitatis" of Joan. di Cuba, published at Augsburg in 1485, which treats at length of barley, millet, oats, and wheat.

Rye was cultivated in most of the North American colonies soon after their settlements by Europeans. Gorges speaks of it as growing in Nova Scotia in 1622. It was introduced into New Netherland prior to 1626, as it is mentioned among the products sent to Holland from the little colony on Manhattan island that year.

Rye was also introduced into the colony on Massachusetts bay as early as the year 1629. Good crops of this grain, as well as of barley and oats, were raised in Lynn in 1633. Plantagenet enumerates it among the productions of North Virginia (New England) in 1648, and alludes to the mixing of its flour with that of maize in the making of bread. It was also cultivated in South Virginia by Sir William Berkeley previous to that year.

The price of rye in New Amsterdam, in 1637, was 2½ florins per skepel (80 cents per bushel.)

This grain has never entered largely into our foreign commerce, as the home consumption, for a long period, has kept pace with the supply. The amount of rye-flour exported from Philadelphia in 1796, was 50,614 barrels; from the United States in 1801, 392,276 bushels; the amount of rye in 1812, 82,705 bushels; in 1813, 140,136 bushels.

The amount of rye-meal of domestic growth and manufacture, exclusive of the rye unground, with its valuation, exported from the United States for the last thirty-three years, is shown in the following table:

Years.	Rye meal.	Valuation.	Years.	Rye meal.	Valuation.	Years.	Rye meal.	Valuat'n.
	Barrels.	Dollars.		Barrels.	Dollars.		Barrels.	Dollars.
1820–21.....	23,523	55,226	1831–32.....	17,254	75,392	1842–43.....	21,770	65,631
1821–22.....	19,971	75,736	1832–33.....	36,038	140,017	1843–44.....	32,690	104,391
1822–23.....	25,665	91,957	1833–34.....	39,151	140,306	1844–45.....	35,371	112,908
1823–24.....	31,879	85,651	1834–35.....	30,854	129,140	1845–46.....	38,530	138,110
1824–25.....	29,545	73,245	1835–36.....	36,646	173,976	1846–47.....	48,892	225,502
1825–26.....	14,472	49,297	1836–37.....	28,323	165,457	1847–48.....	41,584	174,566
1826–27.....	13,345	47,698	1837–38.....	22,864	110,792	1848–49.....	64,830	218,248
1827–28.....	22,214	59,036	1838–39.....	29,458	145,448	1849–50.....	69,903	216,076
1828–29.....	34,191	127,004	1839–40.....	53,218	170,931	1850–51.....	44,152	145,802
1829–30.....	26,298	87,796	1840–41.....	44,031	138,505	1851–52.....	18,524	64,476
1830–31.....	19,100	71,881	1841–42.....	34,190	124,396	1852–53.....	8,910	34,186

According to the census returns of 1840, the product of the United States was 18,645,567 bushels; of 1850, 14,188,813 bushels; showing a decrease of 4,456,744 bushels. During the year ending June 1, 1850, there were consumed, of rye, about 2,144,000 bushels in the manufacture of malt and spirituous liquors. The amount of rye cultivated in the United States in 1853 may be estimated at 14,000,000 bushels, which, at 90 cents per bushel, would be worth $12,600,000. The diminution of this crop for the last twelve or fifteen years may be attributed in the main to a corresponding decline in the demand for the purposes of distillation, to which a large portion of this grain had annually been applied.

CONDENSED CORRESPONDENCE.

Statement of JOSEPH CORNISH, *of East Granby, Hartford county, Connecticut.*

Rye is raised to a considerable extent in this county, instead of wheat. When sown on a sandy soil, it is almost as white, as good, and a much more certain crop. Guano has been used in its production, and in some instances with great success.

Statement of EDWIN WINSHIP, *of Winship's Mills, Clinton county, Indiana.*

Rye is not extensively cultivated with us; but to those engaged in sheep husbandry, its importance is not duly appreciated. It should be sown the last of August, or early in September; or, if sown among growing corn, it should be done immediately after ploughing the last time. If grown for pasture, sow 1½ bushels to the acre; then early in the spring the weak of the flock may obtain an abundance of succulent food at the very time it is so greatly needed, and cannot be obtained anywhere else. This timely precaution by sheep owners would save, generally, thousands of valuable animals every year.

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

Large quantities of rye are cultivated in this county, for the Baltimore market, where it is mostly distilled. It is one of the most profitable crops we raise. Thirty bushels to the acre we consider a fair yield.

Statement of OSMAN DEWEY, *of Barre, Washington county, Vermont.*

Rye does best on dry land, and is usually sown after corn or potatoes. The usual time of sowing is the last of September or the 1st of October, so as to have it get well-rooted in the fall. But it does well sown just as winter sets in, so as not to sprout before the ground is covered

with snow. If sown after corn or potatoes, on dry rolling land, it will sometimes yield 40 or 50 bushels per acre; but 15 bushels is an average. It is worth from 75 cents to $1 per bushel. At an average yield it would hardly pay the expenses, if it were not for the certainty of getting a good stock.

For rotation of crops, we commonly break up green sward and plant with corn or potatoes; follow with wheat, oats, or rye; seed down and mow from five to eight years, getting from one to three tons of hay per acre. When it yields only one ton per acre, it is ploughed and manured, and kept at corn, wheat, or oats, two or three years, and then seeded down again to grass.

Statement of Raleigh W. Dyer, *of Prillaman's, Franklin county, Virginia.*

This grain was formerly cultivated to a great extent, but is now almost abandoned; the cause of which I do not understand, for there can be no doubt of its great value even as food for stock, and the straw could be made one of our best renovators.

BARLEY.

It is a remarkable fact that we are still in uncertainty whether barley grows wild in the Old World; and if so, in what region this occurs. Even the authors of antiquity were at variance as to whence barley, as well as wheat, the grains chiefly used at that time, had been derived. It has been cultivated in Syria and Egypt for more than three thousand years, and it was not until after the Romans adopted the use of wheat bread that they fed this grain to their stock, as is practised by the Spaniards and Italians at the present day. It is evidently a native of a warm climate, as it is known to be the most productive in a mild season; still its flexibility is so remarkable, that it will grow on the Himalayas at an elevation of from 10,000 to 13,000 feet above the level of the sea, and mature in favorable seasons and situations on the Eastern Continent as far north as 72°.

The introduction of barley into the North American colonies may be traced back to the periods of their settlements. It was sown by Gosnold, together with other English grains, on Martha's Vineyard and the Elizabeth Islands, in 1602, and by the colonists of the "London Company," in Virginia, in 1611. By the year 1648, it was raised in abundance in that colony; but soon after, its culture was suffered to decline in consequence of the more profitable and increased production of tobacco.

Barley appears to have been cultivated in New Netherland as early as the year 1626, as samples of the harvest of that year, raised by the colonists of Manhattan island, were sent to Holland, with other grains, as an evidence of their prosperous condition.

According to the records of the "Governor and Company of the Massachusetts Bay in New England," barley was introduced into that colony in 1629. In 1633, good crops were raised in Lynn.

In 1796, the chief agricultural product of the isle of Rhode Island was barley, considerable quantities of which were raised.

Barley has never been much cultivated in the United States, nor has it entered extensively into our foreign commerce, as we have been consumers rather than producers of this grain. It has been chiefly employed for malting and distillation, and also in considerable quantities as a substitute for sago or rice, after being hulled.

According to the census returns of 1840, the amount of barley raised in the United States, the year preceding, was 4,161,504 bushels; of 1850, 5,167,015 bushels; showing an increase of 1,005,511 bushels. The amount of the barley crop of the United States in 1853, may be estimated at 6,500,000 bushels; which, at 75 cents per bushel, would be worth $4,875,000.

CONDENSED CORRESPONDENCE.

Statement of JOHN SPINY, *of Connersville, Fayette county, Indiana.*

Barley bids fair to become an important crop with us. It is sown the last of August, or early in September, among the standing corn, from 1 to 1½ bushels to the acre, ploughed in with a light plough or cultivator. Some farmers, when the corn will admit, plough it in one way, and cross with the cultivator. The yield is from 40 to 50 bushels to the acre.

The green grain offers an excellent pasture during winter, especially for colts and calves, as they injure the ground less by tramping than old stock. It is better to manage the feeding so that they will not be on the lands after the winter frosts are out of the ground.

Barley ripens with us the last of June, when it is cut and stacked, or, what is better, housed, and afterwards threshed. The straw is saved for winter feeding to cattle, and answers well for horses when cut and fed with the grain crushed into coarse meal. Barley is also valuable for hogs when ground and made into swill, and fed during the first stage of fermentation; or the grain may be soaked in water until it is fully swollen, and then fed to them.

Statement of DANIEL FULTON, *of Bowdoinham, Lincoln county, Maine.*

For many years barley with us was nearly destroyed by insects; but, for the last four years we have raised fair crops. Average yield, 20 bushels; price, 70 cents. It is used principally to feed hogs and poultry.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Barley is pretty extensively grown here. To produce a good crop of barley, the land should be rich, mellow, early, and warm—such as will not suffer from drought. It should be such land as will bring large straw; for if the straw is only large, there seems to be no danger about its fillings. In this respect it is materially different from wheat, which often produces large straw without being at all well filled.

The expenses of raising barley, per acre, is as follows:

Ploughing once	$1 38
Harrowing twice	76
Seed, 2½ bushels, at 60 cents per bushel	1 50
Sowing	13
Harvesting and stacking	1 50
Threshing 20 bushels, at 6 cents per bushel	1 20
Conveyance to market, 3 cents	60
Total	7 07

The above sum divided by 20, which is the average number of bushels raised per acre, and we have 35 cents as the expense of raising a bushel.

Statement of JOHN W. FITCH, *of Troy, Rensselaer county, New York.*

Barley is not cultivated to much extent in this county, although some of our farmers raise it. It requires good land and much care. Twenty-five bushels per acre is above the average yield.

Statement of JOHN B. YOUNG *and* JAMES DE MOTT, *of Ovid, Seneca county, New York.*

Barley is cultivated here to some extent, but is not considered so sure a crop as oats, and requires a better chance to succeed well. Average yield, 21 bushels per acre; but sometimes produces a much higher amount. Cost of production, about the same as oats. In these estimates we say nothing about the expense of manuring, considering the straw an equivalent.

OATS.

The oat, when considered in connexion with the artificial grasses, and the nourishment and improvement it affords to live stock, may be regarded as one of the most important crops we produce. Its history is highly interesting, from the circumstance, that while in many portions of Europe, when ground into meal, it forms an important aliment for man, one variety, at least, has been cultivated from the days of Pliny on account of its superior fitness as an article of diet for the sick. The country of its origin is veiled in the same uncertainty as that of barley

or rye, though the most common variety is said to be indigenous to the isle of Juan Fernandez, while another sort, resembling it, is found growing wild in California. But, as these are met with in places which have been cultivated at former periods, it is probable that they are only outcasts, and not wild aborigines.

This plant was introduced into the North American colonies soon after their settlements by Europeans. It was sown by Gosnold, on the Elizabeth Islands, in 1602; cultivated in Newfoundland in 1622, and introduced by the colonists on Massachusetts bay in 1629. In 1633, good crops of oats were raised in Lynn. It would appear that they were not much cultivated previous to that time, as four hogsheads of oat-meal came to Nantasket, from England, in 1631.

This grain was introduced into New Netherland prior to 1626, as there arrived in Holland, from the little colony on Manhattan island, samples of the recent harvest, consisting of oats and other grains, as an evidence of their prosperous condition.

Although the oat was cultivated in Virginia previous to the year 1648, it has never been very extensively raised there even to the present time.

The oat, like barley, has never much entered into our foreign commerce, as the domestic consumption has always been nearly equal to the quantity produced. The annual average exports, for several years preceding 1817, were 70,000 bushels.

By the census returns of 1840, it will be seen that the total produce of oats in the United States was 123,071,341 bushels; of 1850, 146,584,179 bushels; showing an increase of 23,512,838 bushels. The amount raised in 1853, may be estimated at 160,000,000 bushels; which, at 37½ cents, would be worth $60,000,000.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM P. PHELPS, *of Elmwood, Peoria county, Illinois.*

Oats are produced by ploughing once, as for corn, and harrowing or brushing in the seed, at a cost of $1 25 per acre, and are harvested generally with a reaper, at nearly the same cost. The yield is from 30 to 60 bushels to the acre.

Statement of JOHN M. LESLEY, *of Dansville, Vermilion county, Illinois.*

Oats are not very extensively cultivated here. They yield a tolerably good crop, averaging 25 or 30 bushels to the acre. The seeding and harvesting are very similar to those of wheat. They are usually harvested about the 1st of July, and command a price of from 20 to 30 cents per bushel.

Statement of ADMIRAL B. MILLER *and* JOSEPH BROBST, *of Knoxville, Marion county, Iowa.*

Oats grow remarkably well in this county; much better, we think, from our experience, than in any other part of the State. The amount of seed sown to an acre is from two to three bushels. Average yield, 50 bushels.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Oats are a tolerably sure crop with us, and yield from 35 to 40 bushels to the acre. A large amount is raised and consumed at home, as feed for stock. The unthreshed sheaves are cut fine by horse-power machinery, and mixed with meal, shorts, &c., before feeding.

Barley is raised by only few farmers in this vicinity, but those who do raise it say it yields largely and pays well.

Statement of DANIEL FULTON, *of Bowdoinham, Lincoln county, Maine.*

Oats sown early yield a fair crop; but they are considered an exhausting one. Average yield, 25 bushels; price, 45 cents.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachusetts.*

Oats with many farmers are a profitable crop; and if a man wishes soon to turn the strength of his farm into cash, he can take no more effectual way to accomplish it than by continued ploughings and raising this grain without manure. It is an exhausting crop, but one that is quick in market. When sown after corn it probably gives in many instances 70 bushels to the acre, though the average of all lands, and every species of cultivation, will not exceed 35 bushels. The present home price is 50 cents a bushel.

Statement of GROVE SPENCER, *of Ypsilanti, Washtenaw county, Michigan.*

Oats with us are not considered a very productive crop. I have for several seasons raised them upon well manured corn-ground, and when they were harvested I turned over the stubble, and sowed the same ground to wheat. In these cases I have got a very light growth of straw, while the heads of wheat have been very heavy, long, and full. In connexion with this, I may add that my experiments have convinced me that plaster is very useful upon a wheat crop immediately succeeding oats. I have tried plaster often on corn, and the effect uniformly has been to hasten and enlarge the growth of the stalks, but not to benefit the corn. Thus in the growth of clover, where the main crop is stalks and leaves, plaster is the best fertilizer that is known.

Statement of J. D. YERKES, *of Northville, Wayne county, Michigan.*

Oats are less cultivated here than formerly. Owing to the drought, the yield per acre the past season has not averaged over 16 bushels.

Statement of W. M. JACKSON, *of Fayette, Howard county, Missouri.*

Oats with us are a very certain crop. Average yield, from 30 to 40 bushels to the acre. We sow two bushels to the acre as soon in the spring as the ground can be ploughed, which is generally in March.

Statement of ARMSTRONG O'HARA, *of Saint François county, Missouri.*

Oats here are raised for home consumption, and yield 20 bushels to the acre. Cost of raising, 15 cents per bushel. Market value, 25 cents per bushel.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Oats are extensively cultivated with us, although there is an opinion among farmers that they are an exhausting crop. They are generally sown upon the poorest and most exhausted lands upon the farm; and if after raising a crop of oats, the land is further exhausted, it should prejudice no one against a reasonable plan of raising them. Although they will produce a fair yield upon an indifferent soil, no crop will pay better for manure and good culture. Upon a first-rate soil, in a good condition, they sometimes turn over 100 bushels per acre. Land that we intend for barley or oats should be ploughed in the fall, so as to be ready for sowing as soon as the frost leaves it in the spring. Barley and oats, to produce a good crop, should get a good start before the weather becomes dry and hot.

The following is an estimate of the expense of raising an acre of oats:

Ploughing once	$1 38
Harrowing twice	76
Seed, 2½ bushels, at 40 cents per bushel	1 00
Sowing	13
Harvesting and housing	1 50
Threshing 40 bushels, at 6 cents per bushel	2 40
Conveyance to market	80
Total	7 97

Forty bushels of oats is an average crop; therefore, $7 97 divided by 40 gives 19 cents, which is the expense of raising per bushel.

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

Oats are raised by almost every farmer, and are in general use as food for horses. Forty bushels per acre is a fair yield, though as many as 80, and often 100 bushels, have been raised.

Statement of JOHN B. YOUNG *and* JAMES DE MOTT, *of Ovid, Seneca county, New York.*

The cost of raising a crop of oats, which is generally put in on corn stubble, is estimated per acre, on that supposition, as follows:

Ploughing	$1 00
Seed, 2½ bushels, at 38 cents per bushel	95
Harrowing in seed	40
Harvesting and housing	1 00
Threshing 38 bushels, at 6 cents	2 28
Interest on land, at $50 per acre	3 50
	9 13
Product per acre, 38 bushels of oats, at 38 cents	$14 44
Cost of production as above	9 13
Profit per acre	5 31

Thirty-eight bushels of oats is the estimated average yield in this county, for all sown. Corn-stubble we consider the best land, and the product much larger, say 45 bushels; in some instances, about 80 bushels per acre may be raised under favorable circumstances. This crop is usually cut and allowed to lie in swath some time, to cure, before raking and binding; then "stouted," the same as wheat.

Statement of JOHN HURLBUT, *of Arkport, Steuben county, New York.*

The raising of oats is a money-making business at present, (price 40 cents a bushel,) but no husbandman who has a deed of his farm should think of sowing more than enough for his own use. I am satisfied, from careful observation, that they are the most exhausting to the soil of any crop we raise, with the exception, perhaps, of flax. As proof of this, I would state that a field of oats from which, in 1852, we harvested 80 bushels per acre, twelve years since, could not produce 15 bushels per acre. It was then "worked on shares," and had been cropped with oats for several years in succession. Since then it has been reclaimed by clover, and has not been troubled with oats.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

Oats do well here, yielding from 35 to 50 bushels to the acre. The best time, I think, for sowing, is in February. They are worth as much per bushel as wheat, owing to their scarcity.

Statement of N. LINTON, *of Cochransville, Chester county, Pennsylvania.*

Oats are sown here on ground on which corn grew the previous year, at the rate of three bushels to the acre, as early in the spring as the ground can be got in good order. The yield is from 30 to 60 bushels to the acre, and sells in the neighborhood for 44 cents for 32 pounds.

Statement of JOHN EICHAR, *of Greensburg, Westmoreland county, Pennsylvania.*

A large quantity of oats are raised in this county. The greatest yield is 75 bushels to the acre; average yield, 50 bushels; cost of production, 19⅓ cents; present market value, 37½ cents per bushel; smallest yield that will pay expenses, 24⅕ bushels.

Statement of JOSEPH BOWDITCH, *of Fairfield, Franklin county, Vermont.*

This crop is considered as exhausting to the soil. It is necessarily raised, to some extent, usually upon sward land, to be succeeded by corn or potatoes, and followed by wheat, with herdsgrass, (Timothy,) and clover. We sometimes sow oats with grass-seed, for the third crop. We usually sow three bushels per acre. Average yield upon sward land, 35 bushels; when they succeed corn or potatoes, 60 bushels per acre. It generally costs 34 cents per bushel to raise them. They are worth 37 cents.

Statement of OSMAN DEWEY, *of Barre, Washington county, Vermont.*

Oats are raised to a considerable extent here, because they are a sure crop, and are always in demand as feed for horses. They do best on rich land, but are often cultivated on green sward, without manure, where they will yield from 30 to 50 bushels per acre; but sowed after corn, on rich land, they will yield from 50 to 80 bushels. They are worth from 30 to 42 cents per bushel, and 30 bushels to the acre will pay for raising them.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

This grain is our greatest crop, and without it our farmers could not remain in their present condition. The notion that oats are injurious to the soil is wrong; they are not, unless they are made so by bad management. Land that has produced a crop should not be pastured; but the stubble and large weeds which follow, should be turned under at least 10 inches in August. Oats, by these means, can be made a valuable renovator for a crop of wheat or rye. Our time of seeding is in the month of March. We sow from one to one and a half bushels per acre. The yield is from 15 to 40 bushels, according to the land and the season. They are worth in market from 30 to 40 cents, and at home from 15 to 25 cents per bushel.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

Oats are extensively raised. The average product is probably not far from 40 bushels to the acre. Some crops have yielded as high as 80 bushels. Our soil and climate are well adapted to this product Price from 20 to 22 cents per bushel.

BUCKWHEAT.

Buckwheat is believed to be a native of Central Asia, as it is supposed to have been first brought to Europe in the early part of the twelfth century, at the time of the crusades for the recovery of Syria from the dominion of the Saracens; while others contend that it was introduced into Spain by the Moors, four hundred years before.

This grain appears not to have been much cultivated in this country prior to the last century, except by the Dutch, on the Hudson, and the Swedes, on the Delaware. Samples of American growth were sent to Holland by the colonists of Manhattan island, together with those of other grains, as early as 1626. Previous to the year 1750, it was extensively cultivated by the Dutch of New York for "supporn," and for provender for horses. Holm, in his "History of New Swedeland," (Pennsylvania and Delaware,) mentions it among the productions of that province; and Kalm, the Swedish naturalist, who visited this country in 1748–49, speaks of it as growing in Pennsylvania, New Jersey, and New York.

This product, heretofore, has never entered very extensively into our foreign commerce, although considerable quantities of the flour and grain are annually shipped.

According to the census of 1840, the quantity of buckwheat raised in the United States was 7,291,743 bushels; of 1850, 8,956,912 bushels; showing an increase of 1,665,169 bushels. The amount raised in the year 1853 may be estimated at 10,000,000 bushels; which, at 40 cents, would amount to $4,000,000.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachusetts.*

Buckwheat, of late years, has become a popular crop. It first came into notoriety through its effects in subduing weedy and waste lands; but from the demand for it in market, it is now admitted to all soils, and found to feel the effects of a fertile one like other plants. Average yield 25 bushels per acre, worth $1 25 per 100 pounds.

RICE.

Rice, the chief food, perhaps, of one-third of the human race, possesses advantages over wheat, maize, and other grains, of preserving plenty during the fluctuations of trade, caused by war, famine, or short crops, and is also susceptible of cultivation on land too low and moist for the production of most other useful plants. Like several

other bread-plants in common use, it is never found wild,* nor is its native country known, unless we except the statement of the Danish missionary, Klein, that he found it growing spontaneously in India, which is doubted by some. Linnæus considered it as a native of Ethiopia, while others regard it of Asiatic origin.

Rice was first introduced into Virginia by Sir William Berkeley, in 1647, who received half a bushel of seed, from which he raised 16 bushels of an excellent quality, most or all of which was sown the following year.

This grain is stated to have been first brought into Charleston, South Carolina, by a Dutch brig from Madagascar, in 1694, the captain of which left about a peck of paddy (rice in the husk) with Governor Thomas Smith, who distributed it among his friends for cultivation. Another account of its introduction into Carolina is, that Ashby was encouraged to send a bag containing 100 pounds of seed-rice to that province, from the crops of which 60 tons were shipped to England in 1698; while Darymaple maintains that rice in Carolina is the result of a small bag of paddy sent as a present from Dubois, treasurer of the "East India Company," to a Charleston trader. Upland or mountain rice was introduced into Charleston, from Canton, by John Bradby Blake, in 1772.

The culture of rice was introduced into Louisiana, by the "Company of the West," in 1718.

The amount of rice exported from Charleston, South Carolina, in 1724, was 18,000 barrels; in 1731, 41,957 barrels; in 1740, 90,110 barrels; in 1747–48, 55,000 barrels; in 1754, 104,682 barrels; in 1760–61, 100,000 barrels. From Savannah, in 1755, 2,299 barrels, besides 237 bushels of rough rice; in 1760, 3,283 barrels, and 208 bushels of rough rice; in 1770, 22,120 barrels, besides 7,064 bushels of rough rice. From Philadelphia, in 1771, 258,375 pounds.

The amount of rice exported from this country in 1770, was 150,529 barrels; in 1791, 96,980 tierces of 600 pounds each; in 1800, 112,056 tierces; in 1810, 131,341 tierces.

The following table shows the quantity of domestic rice, and its valuation, exported from the United States for the last thirty-three years:

Years.	Rice.	Value.	Years.	Rice.	Value.	Years.	Rice.	Value.
	Tierces.	Dollars.		Tierces.	Dollars.		Tierces.	Dollars.
1820–21.....	88,221	1,494,307	1831–32....	120,327	2,152,631	1842–43....	106,766	1,625,726
1821–22.....	87,089	1,553,482	1832–33....	144,163	2,744,418	1843–44....	134,715	2,182,468
1822–23.....	101,365	1,820,985	1833–34....	121,886	2,122,272	1844–45....	118,621	2,160,456
1823–24.....	113,229	1,882,982	1834–35....	110,851	2,210,331	1845–46....	124,007	2,564,991
1824–25.....	97,015	1,925,245	1835–36....	212,983	2,548,750	1846–47....	144,427	3,605,896
1825–26.....	111,063	1,917,445	1836–37....	106,084	2,309,279	1847–48....	100,403	2,331,824
1826–27.....	133,518	2,343,908	1837–38....	71,048	1,721,819	1848–49....	128,861	2,569,362
1827–28.....	175,019	2,620,696	1838–39....	93,320	2,460,198	1849–50....	127,069	2,631,557
1828–29.....	171,636	2,514,370	1839–40....	101,660	1,942,076	1850–51....	105,590	2,170,927
1829–30.....	130,697	1,986,824	1840–41....	101,617	2,010,107	1851–52....	119,733	241,029
1830–31.....	116,517	2,016,267	1841–42....	114,617	1,907,387	1852–53....	67,707	1,657,658

*It is to be understood that the wild rice, or water-oat, *(Zizania aquatica.)* which grows along the muddy shores of our tidal and inland waters, is a distinct plant from the common rice, and should not be confounded with it

According to the census of 1840, the rice crop of the United States amounted to 80,841,422 pounds; of 1850, 215,313,497 pounds; showing an increase of 134,472,075 pounds. The amount of rice cultivated in the Union in 1853, may be estimated at 250,000,000 pounds; which, at 3½ cents, would be worth $8,750,000.

CONDENSED CORRESPONDENCE.

Statement of ROBERT F. W. ALLSTON, *of Chicora Wood, near Georgetown, Georgetown district, South Carolina.*

The quantity of rice produced in the year 1852–53, and exported from the plantations, amounted to 140,730 tierces. The following statement, for which I am indebted to a commercial house in Charleston, will indicate the manner in which it was disposed of or consumed:

Receipts and exports of rice at the port of Charleston from August 31, 1852, *to August* 31, 1853.

	Barrels.	
Received, in barrels		140,894
Less stock of 1852, September 1		164
Barrels on hand		140,730
Exported to Great Britain	11,293	
Exported to France	4,515	
Exported to North of Europe	6,703	
Exported to West Indies	16,237	
Total foreign		38,748
Shipped to Northern ports	70,311	
Shipped to Southern ports	17,683	
Total coastwise		87,994
City consumption		12,500
Burned		190
		139,432
Stock on hand September 1, 1853		1,462
Total crop and stock, in barrels		140,894

Of the above, there were exported in the rough (paddy)—

	Barrels rough.	Barrels clean.
To Great Britain	115,446	5,497
To France	11,642	554
To North of Europe	122,488	5,833
Total foreign	249,576	11,884

Coastwise North	114,276	5,441
Grand total	363,852	17,325

The exports in the rough are always estimated at 21 bushels to the barrel of clean rice, and included in the latter.

	Barrels.	
Great Britain, therefore, took in clean rice	5,796	
Do. do. in rough rice	5,497	
		11,293
Or nearly 50 per cent. in paddy.		
France took in clean rice	3,961	
Do. in rough rice	554	
		4,515
Or above 12½ per cent. in paddy.		
North of Europe took in clean rice	870	
Do. do. in rough rice	5,833	
		6,703
Or about 87 per cent. in paddy.		
Total foreign exports, in barrels		22,511
Taken coastwise in clean rice	82,553	
Do in rough rice	5,441	
Or about 6¼ per cent in paddy.		
Total coastwise in barrels		87,994

Taking all things into account, I am inclined to estimate the crop as exceeding that of last year about 5,000 tierces. The market value will be much greater in comparison, not only because prices range higher this year, but also, and chiefly, because there is in the present crop more of strictly prime rice.

Meteorological observations at Waccamaw for the year 1853.

THERMOMETER.

Maximum.	Minimum.	Range.	Mean Temp.
May 7, August 7, 88°	January 28, 29, 25°	63°	62°.77

BAROMETER.

Maximum.	Minimum.	Range.	Mean Altitude.
January 28, 30.58	January 24, 29.24	1.34	30.08

Rain on 93 days—43.5 inches.
The greatest quantity of rain fell in September—8.49 inches.
The least quantity of rain fell in April—4.4 inches.
Dew nights—257.

On the 19th of August, a destructive hail-storm, about five miles in width, passed across the tide-lands of this district, along the Waccamaw and Pee Dee, prostrating in its pelting course, and injuring more or less seriously, some three thousand six hundred acres of very promising rice. Then followed two freshets in the Pee Dee, which in the more northern parts of the same district overflowed, and injured several large tracts of rice in various stages of maturity, the harvesting of which was delayed some fifty days. By adding to this the trying incidents of high tides, which were succeeded by frequent rains, one may readily understand the waste that must have ensued by "mow-burning" the rice, and other damages sustained in curing.

POTATOES.

The common or Irish potato, so extensively cultivated throughout most of the temperate countries of the civilized globe, contributing as it does to the necessities of a large portion of the human race, as well as to the nourishment and fattening of stock, is regarded as but of little less importance in our national economy than wheat, rice, or maize. It has been found in an indigenous state in Chili, on the mountains near Valparaiso, and Mendoza; also near Montevideo, Lima, Quito, as well as in Santa Fé de Bogotá, and more recently in Mexico, on the flanks of the Orizaba; but some of these, if cultivated, doubtless would prove to belong to other species than that of the common potato, of the numerous genus to which it belongs.

The history of this plant, in connexion with that of the sweet potato, is involved in obscurity, as the accounts of their introduction into Europe are somewhat conflicting, and often they appear to be confounded with one another. The common kind was doubtless introduced into Spain in the early part of the sixteenth century, from the neighborhood of Quito, where, as well as in all Spanish countries, the tubers are known as *papas*. The first published account of it we find on record is in La Cronica del Peru, by Pedro de Cieça, printed at Seville in 1553, in which it is described and illustrated by an engraving. From Spain it appears to have found its way into Italy, where it assumed the same name as the truffle. It was received by Clusius, at Vienna, in 1598, in whose time it spread rapidly in the South of Europe, and even into Germany. To England it is said to have found its way by a different route, having been brought from Virginia by Raleigh's colonists, in 1586, which would seem improbable, as it was unknown in North America at that time, either wild or cultivated; and, besides, Gough, in his edition of Camden's Brittania, says it was first planted by Sir Walter Raleigh on his estate at Youghall, near Cork, and that it was cultivated in Ireland before its value was known in England. Gerard,

in his Herbal, published in 1597, gives a figure of this plant, under the name of *Batata Virginiana*, to distinguish it from the sweet potato, *Batata Edulis*, and recommends the roots to be eaten as a "delicate dish," but not as a common food. "The sweet potato," says sir Joseph Banks, "was used in England as a delicacy long before the introduction of our potatoes; it was imported in considerable quantities from Spain and the Canaries, and was supposed to possess the power of restoring decayed vigor." It is related that the common potato was accidentally introduced into England from Ireland at a period somewhat earlier than that noticed by Gerard, in consequence of the wrecking of a vessel on the coast of Lancashire, which had a quantity on board. In 1663, the Royal Society of England took measures for encouraging the cultivation of this vegetable, with the view of preventing famine. Notwithstanding its utility as a food became better known, no high character was attached to it; and the writers on gardening, towards the end of the seventeenth century, a hundred years or more after its introduction, treated it rather indifferently. "They are much used in Ireland and America as bread," says one author, "and may be propagated with advantage to poor people." The famous nurserymen, London and Wise, did not consider it worthy of notice in their Complete Gardener, published in 1719. But its use gradually spread as its excellencies became better understood. It was near the middle of the last century before it was generally known either in Britain or North America, since which it has been most extensively cultivated.

The period of the introduction of the common potato into the British North American colonies is not precisely known. It is mentioned among the products of Carolina and Virginia in 1749, and among those growing in New York and New England the same year. They were much cultivated in the latter in 1750, where they produced well and were of good use. The varieties at that time were the "rough-coats," "red-coats," and the "flat whites." The red-coats were considered the best. In 1770, are mentioned the "reddish," the "bluish," the "white," and the "French" potatoes; the latter of which were flattened in their shape, and of a good flavor.

The famous "Mercer" or "Meshanock" potato of the present day originated on Meshanock creek, by Joseph Gilkey, of Mercer county, Pennsylvania, in about the year 1812.

The sweet potato *(Batatas edulis)* is indigenous to the East Indies and inter-tropical America, and was the "potato" of the old English writers in the early part of the fourteenth century. It was, doubtless, introduced into Carolina, Georgia, and Virginia, soon after their settlements by Europeans, being mentioned as one of the cultivated products of those colonies as early as the year 1648.

Among numerous other products ordered to be imported by the "Governor and Company of the Massachusetts Bay in New England," in 1629, was the potato. Sweet or Spanish potatoes were introduced into New England in 1764, and proved to be more prolific than the common sort, and were brought into general use.

The amount of potatoes exported from South Carolina in 1747–48, was 700 bushels; from Philadelphia in 1796, 9,004 bushels.

The quantity and valuation of potatoes exported from the United

States within the last thirty-three years are indicated in the following table:

Years.	Potatoes.	Value.	Years	Potatoes.	Value.
	Bushels.	*Dollars.*		*Bushels.*	*Dollars.*
1820–21	90,889	30,500	1837–38	118,627	56,898
1821–22	129,814	45,758	1838–39	96,569	57,536
1822–23	104,187	37,241	1839–40	123,549	54,524
1823–24	131,194	44,042	1840–41	136,095	64,402
1824–25	106,954	37,588	1841–42	194,946	85,844
1825–26	87,734	41,583	1842–43	144,991	47,757
1826–27	95,748	39,174	1843–44	182,238	74,108
1827–28	94,898	35,371	1844–45	274,216	122,926
1828–29	77,226	30,079	1845–46	125,150	69,934
1829–30	105,620	39,027	1846–47	164 365	109,062
1830–31	112,875	41,147	1847–48	133,170	86,277
1831–32	106,517	42,077	1848–49	109,665	83,313
1832–33	136,127	52,052	1849–50	155,595	99,333
1833–34	97,427	38,567	1850–51	106,342	79,314
1834–35	83,823	41,543	1851–52	148,916	115,121
1835–36	91,581	43,630	1852–53	225,905	152,569
1836–37	100,703	53,630			

According to the census of 1840, the amount of potatoes of all sorts raised in the United States, was 108,298,060 bushels; of 1850, 104,056,044 bushels, of which 38,268,148 bushels were sweet; showing a decrease of 4,232,016 bushels. This deficiency in the crop of 1849, as compared with that of 1839, is attributed to the discouragement caused by the "potato disease" which has prevailed in most parts of the globe for the last ten or twelve years. The amount of potatoes of all sorts cultivated in the Union in 1853, may be estimated at 106,000,000 bushels; which, at 40 cents, would be worth $42,400,000.

CONDENSED CORRESPONDENCE.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

The past season here was not favorable to the growth of the potato; but our crop, on an average, yielded 217 bushels to the acre. We cultivate a blue variety, which is very good and productive. The Meshanock, or Mercer, is preferred by some, and but few agree upon any one variety as being the best. Cost of production, 25 cents per bushel; market value, 60 cents. No manure is used in their culture.

Statement of DANIEL FULTON, *of Bowdoinham, Lincoln county, Maine.*

For the last eight years, potatoes have been an uncertain crop, on account of the "rot." The best method of cultivation, to avoid this malady, is to plant on sandy loam, where it can be obtained, or on pasture ground, with but little manure. For the last two years, the

rot appears to have been gradually leaving us. Average yield in former times, 200 bushels to the acre; during the seasons of rot, 50 bushels; the last two years, 100 bushels. Since the rot commenced, the average price has been about 70 cents.

Statement of SIMON T. ASHETON *and* ELIJAH MYRICK, *trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

Potatoes, with us, thrive well. In their culture we employ nearly the same kind of manure as with our other crops; not that we prefer long manure, but because we do not consider the extra labor of overhauling improves the yield or quality sufficient to remunerate. The value per barrel, delivered at the Groton depôt, is $2 50.

The rotation of crops pursued by us is as follows: first crop after turning under the sward, potatoes; second, corn; third, oats; then three to five years in grass for hay.

The potato disease.—In the spring of 1849, we planted two acres of potatoes, as early as the 10th of April. In due time they came up, flourished, and produced a fine crop, all perfect and sound, while those planted in the latter part of May were smitten with the disease. We were thus induced to try early planting again. The next spring the ground was prepared, and the seed put in as early as the 1st of April. But this experiment proved of no avail against the ravages of the disease. The rot prevailed so, that they were not worth harvesting. But it happened in the spring of the same year a friend presented us with a peck of "black potatoes," as he called them. They were not the common "black kidney potato," but a variety with which we were wholly unacquainted. They were planted in the midst of other potatoes, and all proved sound and good, while the other potatoes around them were affected with the rot. We have continued to plant this variety, and have distributed them freely among our neighbors, who have informed us that the crop has never failed from disease. We have planted them four successive years, and have not lost a bushel, and can recommend them to any one wishing to obtain a variety not subject to the disease. When boiled, they are good and mealy, but not so light-colored as many other sorts. They are productive to a fault.

Statement of HORACE PARKER, *of West Teresa, Jefferson county, New York.*

From my experience, I will give the following short rule for raising potatoes, to be adopted by any if they are willing to try: Plant on dry ground, new or sandy, if to be had; next on sod land, free from manure, both early and late in the season; let the rows be north and south, say four feet apart, and cultivate, if possible, in dry weather. If your crop is smitten with the disease, omit digging as long as the season will admit.

Statement of HEMAN POWERS, *of Lewiston, Niagara county, New York.*

Owing to the ravages of the rot, the potato has of late years ceased being considered a reliable crop. The mysterious disease which has

for some years past affected this valuable esculent has occasioned much discussion among practical as well as scientific agriculturists; but thus far the cause of it has not been satisfactorily ascertained, nor has there as yet been any adequate remedy devised.

Potatoes require a cool and damp soil, situated in an elevated position; and when practicable, new ground. A loamy muck, light and friable, is preferable, where a virgin soil is not attainable. Fresh manure should not be applied to this plant, as it has been found, on trial, to increase the rot; but the field should be well manured, if manured at all, the year previous. For seed the very best tubers should be selected, which should be planted whole, as the young plant draws much of its sustenance in its first stages of vegetation from the old tuber. The "pink-eyes" are considered the best for the table; and the "Merinos" for stock, as they are so much more prolific. The average yield in this county is about 150 bushels to the acre. Planting in hills is preferred, although the old practice of earthing up the soil round the vines is not generally approved. Deep ploughing, as with corn and wheat, is preferable. Apples, especially sweet ones, are an excellent substitute for the potato, particularly for feeding stock; and the expense of raising them is not more than one-fourth that of raising potatoes, even when a full crop is expected, untouched by the rot.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

What is wanting in the potato disease is not a remedy, in the strict sense of the term, but we need the restoration of this vegetable to the condition it was in twenty years ago, when nearly every variety, however planted, and growing in whatever weather, was at least usually free from disease. Nothing but the regeneration of the race will, I think, accomplish this in this country. This has been done effectually under my own hand, by importation from the native land of this valuable plant, as well as by seedlings, produced variously from imported and home sorts. Thus, a variety imported in May, 1851, called the "Rough Purple Chili," has perfectly withstood the disease in the culture of 100 bushels. I spread it widely last spring for planting, and in every case but one I hear the most favorable reports of its vigor and health. So, also, have many hundred seedlings, derived from this and other varieties, proved hardy in large proportions.

The hope all along has been indulged that soon the causes of disease, be they what they may, would pass away. Such a hope has been singularly disappointed this year. Physiology and experience are, I think, fast verging to the conclusion that atmospheric changes—that is, climate or weather—especially as connected with a course of culture too stimulating, are the causes of almost all vegetable maladies; and not less the cause, similarly, of most animal diseases. No plant nor animal has a natural immortality; climate and the stimulation of culture are the falling weight by which both are kept for a time in motion, and by which both are in the end run down.

This suggests the most important inquiry—one which seems not to

have been distinctly proposed heretofore: What is the acme of hardiness in a plant, (and so correspondingly in an animal,) to which it is desirable and possible to attain? Is it a state of vigor absolutely incapable of injury by climatic influence—one above all impression, for instance, of the sudden changes of a northern or the hot damps of a southern climate? But such a point is incapable of attainment, since it involves the idea of a natural immortality in plants—a notion contradicted alike by physiology and experience. If, then, such an attainment be impossible, how much short of it is attainable? Clearly this much: such a state of hardiness and vigor as shall, under all changes and severities ordinarily occurring in the weather, preserve the health of all plants constitutionally adapted to that climate, but which yet may not sustain them under all possible, and even occasionally actual, enhancements of climatic influence.

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

Potatoes are raised in this county in large quantities, and are yet regarded as a profitable crop. Of late years, this vegetable has suffered from the rot, and has otherwise greatly degenerated. I well remember when my father raised 200 bushels to the acre; but now, with the same culture, we cannot grow more than 70 bushels. Nor does it appear to be the defect of the soil, as other crops thrive as well as in former days.

Statement of P. W. GILLETT, *of Astoria, Clatsop county, Oregon.*

The potato, with us, is free from disease. The ground, when cultivated with this crop, is ploughed deep, well pulverized, and planted in rows three feet apart each way. If the rows are straight, a free use of the cultivator and shovel-plough is made. We obtain a large yield from our new, rich lands, without manure; yet fertilizing matter vastly increases the product.

About $1 50 per bushel is the average price of potatoes.

Statement of WILLIAM M. MACY, *of Quercus Grove, Lynn county, Oregon*

Irish potatoes, with us, produce an abundant crop with little attention. The ground is broken up in the spring, laid off as for corn, and planted. They grow until September, which is the proper time for digging. If not taken from the ground before the autumn rains come, a second crop starts up, which by December are the size of a hen's egg; and what is more rare, the haulms above the ground produce potatoes, frequently from every joint of the stem; and this season potatoes have grown up the stalk quite to the seed-balls!

The yield of potatoes to the acre is 500 bushels and upwards, without limit. They are worth $1 per bushel.

Statement of H. A. CASE, *of Troy, Bradford county, Pennsylvania.*

The "round pink-eyes" and "Mercers" are our best kinds. We plant them in good ground, cutting our seed, and putting from three to

five pieces in each hill; fertilizing them, generally in the hill, with barn-yard manure. We generally receive about 70 bushels to the acre, though double and even treble this amount has been harvested. As yet, we have not suffered much from the "rot." We think ashes, applied at the rate of about a handful to each hill, a good preventive. We know of no cure. The average price for the last ten years, 31 cents per bushel.

Statement of JOSHUA S. KELLER, *of Orwigsburgh, Schuylkill county, Pennsylvania.*

From 200 to 250 bushels of potatoes are considered a good crop to the acre. Under extraordinary circumstances, we are told that 300 bushels, and even more, have been obtained.

The average price of potatoes is from 60 to 70 cents per bushel. To raise the above named quantity, manure must not be forgotten. It is hard to say what an average crop might be. I prepare corn-stubble for this, by ploughing in manure; mark it off in rows, and cover the seed thinly; then keep the weeds down by frequent cultivation, and that before the blossoms appear.

Statement of JOHN EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

Potatoes are one of our most profitable crops, nearly all of which are consumed in the county, owing to the demand for them along the railroads now in progress of construction. They are still affected with the "rot" in this neighborhood. Low, moist lands and barn-yard manure appear to increase it, while on dry, sandy soils they are generally free from disease while growing. The greatest yield is 150 bushels to the acre; average yield, on good sandy loam, 60 bushels. Present price, 50 cents per bushel; smallest yield that will pay expenses at present prices, 30 bushels to the acre.

Statement of JOSEPH BOWDITCH, *of Fairfield, Franklin county, Vermont.*

This year our county sent 1,000 tons of starch to market, before the potato was diseased. We do not now exceed 20 tons a year, as only the refuse potatoes are worked. We formerly raised 300 bushels per acre, but now 150 is an average yield. I have frequently heard the potato called very exhausting to the soil. I have cultivated three acres of potatoes seven years in succession, with an average yield of 200 bushels per acre. The eighth year I sowed to spring wheat, (1852) which produced 23 bushels per acre. My method of cultivation is this: Plough deep, late in the fall—the deeper the better. I plough in the fall in order that I may turn under the potato-vines, and that the frost may more effectually do its work. It will become both earlier and lighter for being turned up to the frost. I plough late, that the fine litter and enriching matter in the soil may not be washed away by the heavy rains, as it certainly will be if the ground is not level, which was the case with the three acres I cultivated; it will also plough much easier, and will allow that implement to run to a greater depth when

the ground has become well saturated, than it can before the rains. I plough in the fall from 10 to 12 inches deep, with a pair of strong horses. In the spring I put on 300 bushels per acre of manure, partaking largely of straw. I then plough as early as the ground will work light, harrow, and plant the rows 45 inches, and the hills 18 inches apart. As the seeds are dropped, a boy follows with a dish, dropping directly upon them at the rate of 100 pounds of plaster per acre. I then cover with the hoe three inches deep. As soon as the shoots make their appearance I go through with the cultivator, and give the plants a dressing with the hoe, hilling very slightly. Before the vines drop I give them a dressing; this time using the plough, passing twice in a row, that I may give them a thorough earthing; always being careful to keep the manure covered, both in planting and hoeing.

I plant the long reds—10 bushels per acre—first cutting them through lengthwise, then into pieces having two eyes each; putting two pieces into each hill. I have tried various kinds of seed, and have found none that pays regularly except the long reds. The tops of other kinds frequently die when the tuber is but half grown. The long reds continue to grow until they are ripe. I prefer digging as late as the 10th of October, unless we have hard frosts earlier. During the seven years that I cultivated this field in potatoes, I did not lose by the rot, in the fall of the year, over one bushel in 50; nor to exceed one-tenth when kept through the winter.

The usual price of potatoes here, in the fall, is 20 cents per bushel; in the spring, 40 cents.

Statement of OSMAN DEWEY, *of Barre, Washington county, Vermont.*

Potatoes are not a sure crop with us, though they are cultivated to a considerable extent here. They do best on an old pasture without manure, on dry land, and will yield on an average 200 bushels per acre. They are worth 25 cents per bushel. One hundred bushels will pay for cultivating an acre.

INVESTIGATION OF THE POTATO DISEASE.

SIR: I have the honor to submit the following report on the microscopic examination of various specimens of potatoes affected or supposed to be affected with the "potato rot." The first potatoes brought to the office were intended as samples of the early stage of the disease, which it was thought could not have been detected but for the presence of certain insects in the stem, which insects themselves were considered to be the cause of the disease. A second parcel of the same sort, but presumed to be in a more advanced stage of the affection, was furnished at a later date.

A most careful examination of these potatoes, continued through several months, resulted in the conviction that they contained no trace

of any disease whatever, and that the injury, if any, arose from the premature destruction of the vines, which left the tubers small but healthy. Mr. Henry F. French, of Exeter, New Hampshire, kindly furnished the office with potatoes in various stages of decay, and those that were not too far gone were made the subject of long continued observation. By keeping them dry the progress of the disease was greatly retarded, and its effects could be watched with the greatest ease. The marks of this malady are most distinct and unmistakable. When the smallest portion of an affected part is seen under the microscope, the walls of the cells are coated on the inside with a brownish granular substance which increases with the disease. At first, the starch grains are uninjured, and have none of the brownish matter upon their surface. On the other hand, the small cubical crystals so common in the cells of the potato, become brown at an early stage, apparently from a deposition of this same coloring matter. Even at a later period, if the cells are broken open, the starch will be found unaltered; showing its distinctive markings, and the reaction with polarized light, as in the healthy plant. So far nearly all observers agree, and there can be no doubt as to the identification of the disease. Influenced by the high reputation of Payen, I commenced the examination somewhat predisposed to his view, that the mischief was caused by a microscopic fungus penetrating the potato. But, after the most extensive examination, I am compelled to say that I have seen no indications of such fungus in most of the cells examined. Several forms, it is true, can be found on the surface of the decayed portions, and also immediately beneath the surface, but the progress of the disease, with all its distinctive characters, may be traced far beyond any such growth. Various fungi, known under the common name of "mould," are to be found on potatoes, and other vegetable substances, where there is even but a superficial injury or decay. In the case of the "potato disease," the decayed portions of the tuber afford the finest possible medium for such growths, resembling, in the more advanced stages, a mass of paste, and containing in fact nearly the same substances. The growth of mould under such conditions is too well known to need more than a reference.

I have looked over a large number of authorities on this subject, and find that the greater part of them have finally taken this same view, viz: that the growth of fungi or insects, in and upon the potato, is a *consequence* and not a *cause* of the potato rot.

It would be folly to attribute the mischief, as some have done, to insects whose range even in this country is so limited that we should have to ascertain for a wide-spread and common evil, a new and distinct cause in each portion of the United States, and the same for Europe.

It is not generally known, as it should be, that the potato is liable to several distinct maladies, but that the one now spoken of, and the most serious of all, is not as recent in its origin as has been supposed. It is even probable that in its native region, the plant has always been subject to the same affection. Care should be taken by observers not to confound various maladies under one name, or the results obtained will be worthless.

Those who wish to investigate the matter with any hope of adding to our knowledge on this subject, should become familiar with some

good representation of the potato plant in its normal condition. The structure of the tuber itself is not so simple as most persons imagine; it is an *underground stem*, and shows all the various forms of tissue which are found in the green stem of the plant. There is reason to believe that in some cases these peculiarities, when noticed for the first time, have been mistaken for the commencement of disease, and that elaborate theories have been built upon even so poor a foundation as this.

The drawings which most completely represent the microscopic character of all parts of the healthy plant, are those of Corda, in the "Oekonomische Neuigkeiten und Verhandlungen," vol. 1, 1847: Prague. It is very tempting to imagine that one has found a simple and easily explained cause of such a serious evil, but no good can follow any such speculations. We must, in the first place, learn what has been done by others, before we undertake to arrive at results which have not been obtained but by the most laborious research of some of the most able observers in the world. It is not likely that any very striking discovery remains to be made. Each successive advance must be the result of the work of many hands, heads, and eyes, and no one fact can be considered as perfectly established until after it has been discussed by a large number of observers.

It seems certain that the brown deposition is a nitrogenous substance, formed in an abnormal manner; but although we can readily imagine that excessive manuring or other causes might lead to its formation, we are yet to learn why the disease is so widely spread all at once, and then ceases for a time—in short, why it is an epidemic.

There are some points in the progress of the affection about the time that the starch begins to change, which have never yet been examined. If fresh specimens can be procured during the ensuing season, I propose to investigate this subject, with the hope that it may lead to some useful practical results in the way of arresting the progress of decay after the disease has commenced.

I am indebted to Dr. Alexander S. Wotherspoon, U. S. A., for the use of an excellent microscope which was very kindly placed at my disposal during the whole time I was engaged in this examination.

Yours, respectfully,

GEORGE C. SCHAEFFER.

Hon. CHARLES MASON,
Commissioner of Patents.

Statement of ADMIRAL B. MILLER *and* JOSEPH BROBST, *of Knoxville, Marion county, Iowa.*

The culture of sweet potatoes, this season, has been exceedingly successful with us. Fourteen potatoes of an average size filled a half-bushel measure heaping full, seven of them weighing 14 pounds.

Statement of RICHARD E. HOLT, *of Jacinto, Tishemingo county, Mississippi.*

The "yellow yam" is the principal sweet potato raised with us. It grows nearly to perfection, weighing from 3 to 12 pounds each, and

produces from 200 to 300 bushels to the acre. We invariably set out the slips, but never plant the potato at all. The yam potato will pay better for labor and capital invested for hogs, than any other crop we raise.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

Sweet potatoes grow well in those soils which are in part sandy, but not so well as they do further South, on account of the shortness of the season. Irish potatoes generally grow well. The kind most preferred in this section is the "Mercer," which is not very prolific nor very large, but remarkable for the whiteness and mealiness of its flesh. The average yield of this kind is 100 bushels to the acre; of other kinds, the product is much larger. The price here is about 40 cents per bushel.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

The sweet potato is grown here occasionally, of a large size, and at a cheap rate; but so uniformly are they deficient in the dry and rich flesh of the Southern variety, that their cultivation here should not be encouraged. Perhaps it would be a matter of useful experiment to determine whether new varieties could not be produced from seed, which would be better adapted to our short summers.

Statement of LUTHER BAILEY, *of the United Society of Shakers, North Union, Cuyahoga county, Ohio.*

Sweet potatoes can be raised here with profit and advantage, and readily command $1 per bushel in Cleveland market. A piece of old ground is first selected, manured, and thrown into beds or ridges 3½ feet apart, and the potato-sets planted at intervals of 16 inches.

TEXTILE AND FORAGE CROPS.

COTTON.

Cotton, which administers so bountifully to the wants of civilized as well as to savage man, and to the wealth and economy of the countries producing it, stands foremost among the crops in the United States, both as regards its superior staple and the degree of perfection to which its cultivation has been brought. One or more of its species is found growing wild throughout the torrid zone, whence it has been disseminated and become an important object of culture in several countries adjacent, where its consumption has increased just in proportion to the progress of the arts and civilization. It is mentioned by Herodotus as growing in India, where the natives manufactured it into cloth; by Theophrastus as a product of Ethiopia; and by Pliny as growing in Egypt,

towards Arabia, and near the borders of the Persian gulf. Nienhoff, who visited China in 1655, says that it was then cultivated in great abundance in that country, where the seed had been introduced about five hundred years before. Columbus found it in use by the American Indians of Cuba, in 1492; Cortez, by those of Mexico, in 1519; Pizarro and Almagro, by the Incas of Peru, in 1532; and Cabeça de Vaca, by the natives of Texas and California, in 1536.

In dividing the genus Gossypium into species, we would follow Dr. F. B. Hamilton, (Linn. Trans., V, VIII,) who says that the pubescence of the seeds is a better criterion than either the number and forms of the lobes of the leaf, or the number of the glands, for distinguishing the varieties. M. Rohr divides the cotton plants with which he was acquainted—

1. Into those with seeds black and rough.
2. Those with seeds brownish-black and veined.
3. Those with seeds sprinkled with short hairs.
4. Those with seeds completely covered with a close down.

According to Dr. Royle, who has been long engaged in the investigation of the subject in Great Britain and in India, the different varieties of cotton may be classed under four distinct species, in the following manner:

1. *Gossypium indicum*, or *herbaceum*—the cotton plant of China, India, Arabia, Persia, Asia Minor, and some parts of Africa.

2. *Gossypium arboreum*—a tree-cotton indigenous to India.

3. *Gossypium barbadense*—the Mexican or West India cotton; of which the Sea Island, New Orleans, and upland Georgia are varieties. It was long since introduced into the island of Bourbon, and thence into India; hence it acquired the name of "Bourbon cotton."

4. *Gossypium peruvianum*, or *accuminatum*—which yields the Pernambuco, Peruvian, Maranham, and Brazilian cotton; especially distinguished by its black seeds, which adhere firmly together. This variety has long since been introduced into India.

The chief varieties cultivated in the United States, are the black seed, or Sea Island, *(G. arboreum,)* known also by the name of "long staple," from its fine, white, silky appearance and long fibres; the green seed, *(G. herbaceum,)* called the "short staple," from its shorter, white staple, with green seeds, and commercially known by the name of "upland cotton;" and two kinds of Nankin, or yellow, *(G. barbadense,)* the Mexican and Petit Gulf.

Of the precise period of the first introduction of the cotton plant into the North American colonies, history is silent. In a pamphlet entitled "Nova Brittania, offering most excellent fruits by planting in Virginia," published in London in 1609, it is stated that cotton would grow as well in that province as in Italy. It is also stated, on the authority of Beverley, in his "History of Virginia," that Sir Edmund Andros, while governor of the colony, in 1692, "gave particular marks of his favor towards the propagating of cotton; which, since his time, has been much neglected." It further appears that it was cultivated for a long time in the eastern parts of Maryland, Virginia, Carolina, and Georgia, in the garden, though not at all as a planter's crop, for domestic consumption.

In another pamphlet, entitled "A state of the province of Georgia, attested upon oath in the court of Savannah," in 1740, it was averred that "large quantities have been raised, and it is much planted; but the cotton, which in some parts is perennial, dies here in the winter; which, nevertheless, the annual is not inferior to in goodness, but requires more trouble in cleansing from the seed." About the year 1742, M. Dubreuil invented a cotton gin, which created an epoch in the cultivation of this próduct in Louisiana. During the Revolution, the inhabitants of St. Mary's and Talbot counties, in Maryland, as well as those of Cape May county, New Jersey, raised a sufficient quantity of cotton to meet their wants for the time. It was formerly produced in small quantities for family use in the county of Sussex, in Delaware, near the headwaters of the Choptank.

The seed of the Sea Island cotton was originally obtained from the Bahama Islands, in about the year 1785; being the kind then known in the West Indies as the "Anguilla cotton." It was first cultivated by Josiah Tattnall and Nicholas Turnbull, on Skidaway island, near Savannah; and subsequently by James Spaulding and Alexander Bisset, on St. Simon's island, at the mouth of the Altamaha, and on Jekyl island by Richard Leake. For many years after its introduction, it was confined to the more elevated parts of these islands, bathed by the saline atmosphere, and surrounded by the sea. Gradually, however, the cotton culture was extended to the lower grounds, and beyond the limits of the islands to the adjacent shores of the continent, into soils containing a mixture of clay; and, lastly, into coarse clays deposited along the great rivers, where they meet the ocean tides.

Previous to 1794—the year after the invention of Whitney's saw-gin—the annual amount of cotton produced in North America was comparatively inconsiderable; but since that period, there is probably nothing recorded in the history of industry, including its manufactures in this country and Europe, that would compare with its subsequent increase.

The earliest record of sending cotton from this country to Europe is in the table of exports from Charleston in 1747–48, when seven bags were shipped; another parcel, consisting of 2,000 pounds, was shipped from the same port in 1770; and a third shipment of 71 bags was made in 1784, which was seized in England on the ground that America could not produce a quantity so great. In 1792, there were shipped 304 bales; in the first six months of 1796, 150 bales. From an old custom-house book at Wilmington, North Carolina, it appears that in July, 1768, the ship "Amelia" cleared from that port with an assorted cargo, among which were three bags of cotton. In 1796, there were exported from Philadelphia 911,325 pounds.

The amount of cotton exported from the United States in 1791, was 189,316 pounds; in 1793, 187,600 pounds; in 1794, 1,601,760 pounds; in 1795, 6,276,300 pounds; in 1800, 17,789,803 pounds; in 1810, 93,261,462 pounds.

The quantities and values of cotton and cotton goods of domestic production exported from the United States within the last thirty-three years, are denoted in the following table:

Years.	Sea Island cotton.	Other cottons.	Total value of unmanufactured cotton.	Nankin.	Cotton piece goods, printed or colored.	Piece goods, uncolored or bleached.	Cotton thread and yarn.	Other manufactures of cotton.	Total value of manufactured cotton.
	Pounds.	Pounds.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
1820–21	11,341,066	113,549,339	20,157,484	.....	.....	.....	.....	.....	.....
1821–22	11,250,635	133,424,460	24,035,058	.....	.....	.....	.....	.....	.....
1822–23	12,136,688	161,586,582	20,445,520	.....	.....	.....	.....	.....	.....
1823–24	9,525,722	132,843,941	21,947,401	.....	.....	.....	.....	.....	.....
1824–25	9,665,278	166,784,629	36,846,649	.....	.....	.....	.....	.....	.....
1825–26	5,972,852	198,562,563	25,025,214	.....	.....	.....	.....	.....	.....
1826–27	15,140,798	279,169,317	29,359,545	14,750	45,120	951,001	11,175	137,368	1,159,414
1827–28	11,288,419	199,302,044	22,487,229	5,149	76,012	887,628	12,570	28,873	1,010,232
1828–29	12,833,307	252,003,879	26,575,311	1,878	145,024	981,370	3,849	127,336	1,259,457
1829–30	8,147,165	290,311,937	29,674,883	1,093	61,800	964,196	24,744	266,350	1,318,183
1830–31	8,311,762	268,668,022	25,289,492	2,397	96,931	947,932	17,221	61,832	1,125,413
1831–32	8,743,373	313,471,749	31,724,682	341	104,870	1,052,891	12,618	58,854	1,229,776
1832–33	11,142,987	313,555,617	36,191,105	2,054	421,721	1,802,116	104,335	202,291	2,532,517
1833–34	8,085,937	376,631,970	49,448,402	1,061	188,619	1,756,136	88,376	51,802	2,085,994
1834–35	7,752,736	379,606,256	64,961,302	400	397,412	2,355,202	97,808	7,859	2,858,681
1835–36	8,544,419	415,086,888	71,284,925	637	256,625	1,950,795	32,765	14,912	2,255,734
1836–37	5,286,971	438,924,566	63,240,102	1,815	549,801	2,043,115	61,702	175,040	2,831,473
1837–38	7,286,340	588,665,957	61,556,811	6,017	252,044	3,250,130	168,021	82,543	3,758,755
1838–39	5,107,404	408,516,808	61,238,982	1,492	412,661	2,525,301	17,465	18,114	2,975,033
1839–40	8,779,669	735,161,392	63,870,307	1,200	398,977	2,925,257	31,445	192,728	3,549,607
1840–41	6,237,424	523,966,676	54,330,341	.....	450,503	2,324,839	43,503	303,701	3,122,546
1841–42	7,254,099	577,462,918	47,593,464	.....	385,040	2,297,964	37,325	250,361	2,970,690
1842–43	7,515,079	784,782,027	49,119,806	.....	358,415	2,575,049	57,312	232,774	3,223,550
1843–44	6,099,076	657,534,379	54,063,501	.....	385,403	2,298,800	44,421	170,156	2,898,780
1844–45	9,389,625	863,516,371	51,739,643	1,174,038	516,243	2,343,104	14,379	280,164	4,327,928
1845–46	9,388,533	538,169,522	42,767,341	848,989	380,549	1,978,331	81,813	255,799	3,545,481
1846–47	6,293,973	520,925,985	53,415,848	8,794	281,320	3,345,902	108,132	338,375	4,082,523
1847–48	7,724,148	806,550,283	61,998,294	2,365	351,169	4,866,559	170,633	327,479	5,718,245
1848–49	11,969,259	1,014,633,010	66,396,967	3,203	466,574	3,955,117	92,555	415,680	4,933,129
1849–50	8,236,463	627,145,141	71,984,616	.....	606,631	3,774,407	17,405	335,981	4,734,424
1850–51	8,299,656	918,937,433	112,315,317	.....	1,006,561	5,571,576	37,260	625,808	6,241,205
1851–52	11,738,075	1,081,492,564	87,657,732	.....	926,404	6,139,391	34,718	571,638	7,672,151
1852–53	11,165,165	1,100,405,205	109,456,404	.....	1,086,167	6,926,485	22,594	733,648	8,768,894

According to the census returns of 1840, the amount of cotton cultivated in the Union was 790,479,275 pounds; of 1850, 987,637,200 pounds; showing an increase of 197,157,925 pounds. The amount of the cotton crop of 1853, may be estimated at 1,000,000,000 pounds; which, at 7 cents, would be worth $70,000,000.

INVESTIGATION OF THE FIBRE OF THE COTTON PLANT.

As the cotton plant—which administers so much to the wealth, economy, and wants of this country, as well as to the world at large—is annually becoming of greater importance to our nation, anything that will tend to improve its culture or manufacture should receive public attention and be encouraged. In consequence of a degree of uncertainty prevailing in regard to the amount of injury or loss sustained by careless harvesting and ginning, the following circular was sent to various manufacturers in different parts of the country, which elicited the replies thereunto annexed:

CIRCULAR.

UNITED STATES PATENT OFFICE,
June 23, 1853.

SIR: A communication has been received in this bureau from an intelligent planter of Georgia, accompanied by several bolls of cotton, asking information on the following points relating to the harvesting, ginning, packing, and manufacture of cotton:

1. Does the well-matured cotton-boll yield its staple, or fibre, of different lengths in one or the same boll or lock? or does the product of fibre of an individual seed exhibit an approximate uniformity in its length before separation by the gin?

2. What per-centage of loss would be considered a fair average in your establishment for a twelve-month stock, on the gross weight of cotton consumed, by reason of dust, grit, or sand?

3. What is the per-centage of loss, as above, caused by vegetable substances, as leaves, trash, motes, grass, &c.?

4. What is the per-centage of loss arising from shortened or divided fibre, caused by ginning, which flies off during the process of manufacturing; and how much, in your judgment, are the strength and durability of your fabrics diminished in consequence of such breakage or division?

5. Has the general condition of cotton staple, as to length and strength, deteriorated within the last twenty years?

The object of the communication above referred to, appears to have been intended to disabuse and correct any sentiment which may exist in the cotton-growing States among the planters, that it is really non-essential, in point of value, to the manufacturer, whether the staple is broken by ginning, or whether it is made foul from grass or other extraneous matter, except so far as it may be increased in its weight thereby. The question has also arisen, whether there may not be an improvement made in the cotton gin, should it prove that the fibres attached to each seed are of approximate or uniform lengths.

Any information which you may be able to impart relative to the points herein considered, will be acceptable to this bureau, and will be duly appreciated by the cotton-planters of the South.

You will understand these inquiries to apply only to "short-staple" or "upland" cotton.

Very respectfully, your obedient servant,
CHARLES MASON.

BOSTON, *July* 14, 1853.

SIR: I have had the honor of receiving a communication from you, asking information on some points relating to the harvesting, ginning, packing, and manufacture of cotton, induced by a communication in the Patent Office received from an intelligent planter from Georgia.

This is a subject that interests the planter and manufacturer more than is generally imagined, and I shall be most happy if the facts which I am able to give in relation to it shall serve in any degree to "disabuse and correct any sentiment which may prevail in the cotton-

growing States among the planters, that it is really non-essential, in point of value, to the manufacturer, whether the staple is broken by ginning, or whether it is foul from grass or other extraneous matter, except so far as it may be increased in its weight thereby."

I will endeavor to answer the points in the order in which you have stated them.

Query 1. My knowledge on this point is quite limited; but, from occasional examinations of what were said to be "well-matured bolls," I should judge that the fibre before separation was always somewhat variable in length—more or less so according to circumstances, such as the exhausted or worn-out condition of the soil, unfavorable season, bad or neglected culture, proximity, while growing, to fields of different grades or kinds of cotton, and various other causes, which the intelligent and observing planter will at once perceive and be able to understand and account for. If this be so, it must be apparent that all attempts to render the length of staple more uniform in the bolls will be attended with some difficulty to the planter, and not willingly submitted to by him without a prospect of remuneration. As my opinion differs, in this respect, from one whose habit of observation is exceedingly accurate, and in whose opinion, in matters relating to the cotton manufacture, I have greater confidence than in that of any other man with whom I am acquainted, it will give me great pleasure to receive a few well-matured bolls (which I take to mean well-ripened) of different grades and qualities of cotton, in order that a critical examination of them may lead to the establishment of a fact which now appears to be unsettled.

Query 2. It is not usual to keep a separate account of these substances, unless they appear to be excessive. Ordinarily, I do not think they would exceed from 5 to 10 pounds in a bale of 400 pounds.

Query 3. These substances, like the last, being of little or no value, are not usually weighed; but after causing the manufacturer much labor to separate them, and injury or waste to the fibre of the cotton, are sold from the picker in a mass for a mere trifle. Probable loss from the gross weight, 4 or 5 per cent.

Query 4. This point opens a wide field which has been but little explored by the manufacturers of this country, and of course not duly appreciated by them. In fact, I doubt whether some of them ever thought that the cotton did not grow precisely as it comes to them in the bale. In truth we have, strictly speaking, but very few thoroughly bred manufacturers here. Our principal establishments are large corporations, making shirtings and sheetings from No. 18 to 25, for the last twenty or thirty years, requiring very little skill. They, in most cases, are managed by ministers from their pulpits; judges taken from the bench; lawyers from their clients, if they have any; merchants and schoolmasters, not always put there on account of any peculiar fitness for the places, but frequently because the places possess a peculiar fitness for them—sometimes as a reward for some legislative or political favor, and sometimes from family connexion and favoritism.

The directors mostly reside in Boston—gentlemen of capital, shrewd, and generally excellent managers of their own affairs, but in most cases very little acquainted with the details of the business at the factories.

In consequence, orders are sometimes given to "heave to the ship," when there is no rudder. After this digression let us proceed.

What the well instructed manufacturer wishes to obtain is a roving or strand of cotton of suitable size for the spinning machine, so evenly constructed, that when severed by a sharp instrument in different places, it shall present to view the same number of distinct fibres. If the fibres are sufficiently long and uniform in length, little more is necessary than to straighten, place them parallel to each other, and reduce the strands to a proper size, which can be done with very little labor. As it is, there are sometimes almost as many lengths as fibres, and the manufacturer has to exercise his skill to overcome this defect, just in proportion to the fineness of the yarn he has to make. This can only be accomplished in part, and by doubling and drawing.

The mill at Portsmouth, New Hampshire, making No. 70 yarn, double, as I understand, one hundred and forty thousand times. This requires additional machinery, adds much to the labor, causes waste, and does some injury to the staple; it, however, gives evenness, and consequently strength, but it does not restore that which was taken away by the gin. I think, therefore, it must appear plain to every one, that any breaking of the staple by ginning, or in any other way, tends to increase the cost and diminish the value of the article when manufactured. Cotton, therefore, is less valuable just in proportion to the fibres broken.

I would here remark, that cotton should never be ginned when wet or damp. Its adhesiveness, when in that condition, is very much increased, and the velocity of the saws does not give it time enough to separate without breaking.

The idea that grass and other extraneous matter may be mixed with cotton, and do no other injury than to increase the weight, is another pernicious sentiment. Let a pound of bran be mixed with a barrel of flour—will any one say that the barrel of flour is injured only to the value of one pound?

Some attempts have been, and are still being made, to improve the cotton gin, so that less injury may be done to the staple. Whether this can be accomplished without diminishing the capacity of the machine to perform its work, or to what state in their progress they have arrived, I am not informed.

Query 5. Has the general condition of cotton staple, as to length and strength, deteriorated within the last twenty years?

I think there is no good reason for believing that the staple is not as long and as strong now as at any former period, when grown under like circumstances. It is true that we have less fine cotton now in proportion to the whole crop than formerly; but this is no proof that it is not produced. If the wants of the manufacturers required it, and they would pay a remunerating price, I am told there would be no lack of fine cotton.

The cotton business with us is still in its infancy. So far as variety and fineness of fabric are concerned, little change is observable for the last twenty to thirty years. Whether it is destined to go on to the extent, variety, and fineness to which it has arrived in Great Britain, is problematical. Hitherto we have done nothing requiring much skill.

Fabrics under thirty or forty hanks to the pound, it seems, can be made by ministers or lawyers, or any one else, (provided they are fortunate in the selection of their cotton;) but whenever we shall attempt the finer grades, a different training by a different class of managers will be found necessary. We now substitute for skill a higher grade of cotton, and depend for remuneration on a higher price for the article when manufactured. So far as my experience goes, this can only be relied upon to a very limited extent. Some five and twenty years ago I undertook to make No. 40 shirtings of Sea Island cotton, and they cost me 2 or 3 cents per yard more than those made of the best New Orleans. I think they were really increased in value as much as the additional cost; but I found, when I came to sell them, that I had to go into an explanation with every purchaser. Sometimes, by the expenditure of much time and labor, I was enabled to get half a cent, and sometimes a whole cent, for what cost me two or three; consequently, I had to drop the use of Sea Island cotton altogether. All calculations of this kind must prove fallacious, for they are based upon the supposition that all purchasers are judges of what they buy, which is not the fact. The skilful manufacturer abroad strives to please the fancy, and when successful in this, at the least possible cost, he defies competition. This is a much safer reliance than upon any legislative aid or protection. Should the emigration from Great Britain continue, it may ultimately bring the price of labor there more nearly to ours, and put us on a more equal footing so far as labor is concerned. It will probably be as well in the main that their labor should come up to ours, for it matters little whether a yard of calico is sold for 10 cents or 12½ cents, provided 12½ cents is only a remunerating price, and it cannot be had for less. It only places calico in a different relative position in the great list of articles of a similar nature, and used for similar purposes.

I have shown your communication to Samuel Batchelder, esq., of this city. He commenced his successful career in the cotton manufacture, I think, about the same year with myself (1808.) He is still as actively engaged in the business as ever; and having been for some time impressed with the importance of the subject, and being prepared with experiments already made, has given me his views quite in detail, which I hereunto append, deeming them highly important and much to the point.

In order to keep alive the recollection of the past, I enclose a small strip from the piece of British cotton purchased by me at a prize sale in the fall of 1813, the second year of the war, which cost 85 cents per yard cash, Boston money—equivalent to specie, as the Boston banks did not suspend payment at that time. A like article now would not bring more than 3½ to 4 cents. It was then the fashion to have goods of this description highly glazed, so as to exclude the fabric entirely from view. It was so in this case; but time has separated the substance with which it was filled, and it now only presents the skeleton of a production once pleasant to the sight, somewhat similar to the animal kingdom under like circumstances. This specimen goes to show the condition of our manufactures at that time, and our complete dependence upon foreigners for all articles of a sim-

ilar kind. I then sold calicoes for 75 cents per yard that would not now bring more than 6 cents. Cotton was brought from the South by ox-teams, and a regular "ox-team express" was established throughout the country.

Very respectfully, your obedient servant,

ROBERT ROGERSON.

Hon. CHARLES MASON,
Commissioner of Patents.

BOSTON, MASS., *July* 9, 1853.

DEAR SIR: The questions from the Patent Office which you have communicated to me respecting cotton are very important, and very interesting to me, as they relate to some views of the subject which I have endeavored to impress upon the minds of the planters for two or three years past, as far as it has been in my power.

1. It appears to me, from the examination of some parcels of cotton that have been carefully ginned in a manner to avoid breaking the staple, as well as some samples in the seed without ginning, that there is a very near approximation to an equality in the length of fibre of well matured cotton in the same boll, or of the same growth.

2. It would be impossible to state any average loss on account of dust, grit, or sand. We have opened bales of cotton, where the loss from this cause has been, by weight, between 15 and 20 per cent., while perhaps in ordinary cases it would not exceed 1 per cent. I suppose this depends much upon the soil where the cotton is grown, and upon the season. On a dry, sandy soil, or in very dry weather, the winds might blow the dust and sand so that much would lodge in the cotton boll, particularly if it should hang exposed for any considerable time in the field.

3. As to the loss from leaves, seeds, and vegetable matter, all the waste of this kind, as well as dust and sand, is separated from the cotton, as far as possible, before it comes to the card. From careful experiments at two different periods, of several days at each time, upon more than thirty bales of cotton of different lots, I found the loss in one experiment 3 per cent., and in the other 4⅛ per cent. This was the result of five operations upon the cotton, by five different machines. From the amount of labor and expense in these operations, some judgment may be formed of the correctness of the opinion alluded to, as prevailing among the planters, that the mixture of such substances with the cotton was of little consequence to the manufacturer, except as so much loss in weight. It ought also be borne in mind that the manipulation in all these operations produces some injury to the staple, and the result of the whole is only to clean it from those substances which ought never to have been mixed with it, and put it in the same condition in which it ought to have been before it was put into the bale.

4. The same experiments show that the loss by "flyings" in the carding, which consist of short fibres of cotton, either broken in the ginning or of immature growth, in the one case was 4¾ per cent., and in the other 5 per cent., which, it will be noticed, is more than the loss in weight from sand, seeds, and other vegetable matter. The value of

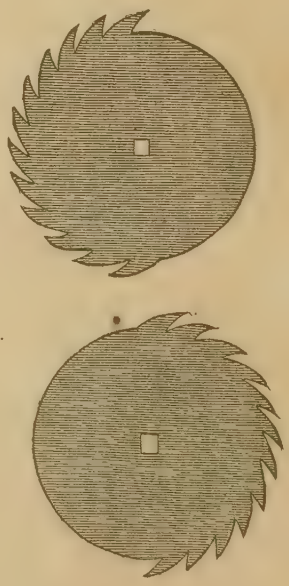
the material is much diminished from this cause, and to a greater extent in the manufacture of fine goods than for coarser fabrics. So far as this short cotton goes into the goods, it diminishes the strength and durability of the article; and, besides, increases the cost, by the additional labor required in spinning and weaving. To a certain degree, as the value of the Sea Island cotton is increased by additional length of staple, that of upland cotton will be diminished in proportion as the short, mossy, and broken staple may prevail. To give some idea of what the difference in value may be, I would mention that in purchasing cotton for the supply of a mill of 26,000 spindles, for three or four years past, my instructions to agents at the South have been, to purchase Mastodon or other similar cotton of extra length of staple, at 1½ to 2 cents per pound above the price of upland or New Orleans cotton of corresponding grade; and the shorter staple would depreciate in value accordingly. This depreciation applies to cotton which, though much of the staple may be of good length, contains a considerable proportion of broken and mossy or short fibre, which renders it unfit for those manufactures which require strength and fineness; but, at the lower price, would be purchased for coarse fabrics, to be mixed with other cotton, or used as the English manufacturers use the cotton from India.

5. From my experience, I should not think the length or strength of the common green-seed cotton had deteriorated within the last twenty years. Within a few years something has been done, in various parts of the country, in producing cotton of extra length by planting foreign seed. This I suppose to be the origin of the Dean-seed cotton in Texas, and of the Mastodon cotton; the staple of which, when first planted, was very long, but has *deteriorated* in length from year to year, except where great care has been taken in the cultivation, by planting it in separate fields, at a distance from other cotton. This deterioration can probably best be remedied by planting anew from foreign seed, though I have been told that some planters have succeeded in keeping up the quality and reputation of their crop by planting a small quantity of Sea Island in the field, which has an influence by the mixture of the pollen while in blossom. This plan may be well worth trial, and may have an important effect in improving the staple both in length and strength.

Such experiments in the production of cotton of long staple were very much discouraged in the beginning by the fact that, much of it was purchased for factories at the North, which were expressly built for the spinning of short staple, or upland cotton, and the machinery of which could not be properly adapted to that of longer staple. The consequence was, that they either suffered a loss in attempting to work it, or sold it at the best offer they could get; so that in purchasing a supply four years ago for the mill mentioned above, which was adapted for spinning long cotton, I was able to get a large portion of our stock for 2 cents per pound less than other fair cotton, instead of giving about 2 cents more, as I now do. This low price, and the complaints of the manufacturers, who suffered a good deal of inconvenience from occasionally getting a bale of Mastodon cotton into their mills with other cotton, discouraged the planters from its cultivation, and very few continued to produce it. But many mills are now adopting

a mode of spinning better suited to the long cotton, and this will be more and more the case, as the manufacture of finer goods continues to be extended; so that a regular market may be expected for cotton of superior quality at prices corresponding to its value. This description of cotton, which has been almost unknown in foreign markets until very lately, is beginning to be appreciated there for purposes to which it is adapted, and some shipments abroad have sold at very satisfactory prices. Under these circumstances, it seems to me that there is a fine opportunity for the planters to improve the value of their crops by extending the cultivation of long green-seed cotton, either by the introduction of foreign seed or by improving the quality of such as is now cultivated—the Dean-seed and Mastodon, for instance—by mixing it with the Sea Island, as mentioned above, if that should be found successful, or in any other improved mode of cultivation.

After the long cotton is produced, it becomes very important to adopt the best mode of ginning it, to prevent breaking the staple. The saw-gin operates very well upon the short staple cotton; but when the fibre is long enough to come in contact with two or more saws at the same time, it must of course be broken. To remedy this, I have proposed setting the saws further apart, or to file off half the teeth of each saw, alternately on opposite sides of the arbor, in the manner represented in the margin; so that while one saw is operating upon the cotton, the other will run free. By this or any other mode of ginning the cotton better, the quantity produced by one machine would be diminished, and the expense increased; but that must be expected when the work is done better, and the advanced price of the cotton ought to pay for it. I am told that some which has been ginned the present season upon an improved gin, so as not to break the staple, has sold for 1½ cents per pound extra; and a sample of this cotton which I have seen is well worth the difference, being entirely free from any of the short or broken fibres generally found in cotton ginned in the usual way. Planters, as well as manufacturers, are fully aware of the difference in value between Madras or Bombay cotton and our own New Orleans, and a similar difference would at once be apparent whenever we should put into the market an article superior to the New Orleans, either on account of length and strength of staple, better cleaned, or more free from broken fibres, or in any particular better fitted for the finer manufactures.



The present advance in the comparative price of Sea Island cot-

ton shows the tendency of things in this particular, and is a full confirmation of what I have said above as to the increased value of a better class of cotton.

I have lately received a sample of what was considered a native or wild cotton from Texas; and from the appearance of the staple I think it could not have been produced from the seeds of any of the cotton in common cultivation. The fibre was exceedingly fine, and the lock of cotton had a fleecy appearance, like Sea Island; but the staple was not strong, nor of extra length. It might be improved by cultivation, or mixture in the field with other cotton, and experiments for this purpose would be very desirable.

I have gone into this subject much more fully than a simple answer to the questions proposed would seem to require, but I have long been impressed with the importance of the additional value that might be given to the cotton crop of this country by improving the quality. Our supply of the English market at present is only because they find the quality of our cotton better than they can obtain from any of their own possessions; and while they are making every effort in their power to increase the cultivation and improve the quality in their own provinces, this effort can best be counteracted by us by producing cotton of a quality which is beyond the reach of their competition; and as I think we may do, without any sacrifice of profit, for in both the English and Continental markets I believe a fair difference in price has generally been paid for superior cotton.

Yours, very truly,

SAMUEL BATCHELDER.

ROBERT ROGERSON, Esq.

PATERSON, N. J., *July* 6, 1853.

SIR: In answer to certain queries in a communication from the United States Patent Office, I would state that in the manufacture of sheeting, the yarn No. 15's, good Georgia cotton, we find the loss from dust, dirt, and sand, to be from 6 to 7 per cent., and the loss from seeds, leaves, trash, motes, &c., from 4 to 5 per cent., thus making a total waste on the gross weight of cotton used from 10 to 12 per cent. In making finer yarns, where the cotton is carded more, the loss is greater; but, as we never make finer than 15's, the per-centage of loss is not known. It may here be observed that bale cloth and ropes are not reckoned in the above.

The loss in weight arising from shortened or divided fibre, caused by the cotton being badly ginned, is small, and we have no means of arriving at the exact per-centage; but as regards the quality of the goods, the ginning is very important, as it is impossible to make even and smooth yarn when there is much of the fibre cut short; and to give sufficient strength to the yarn, more twist has to be put in, thus causing a loss in the amount produced by a given number of spindles. In purchasing cotton we always look to this point; there is a great difference in cotton in this respect. Some planters appear to take more care than others; and supposing the fibre of two bales to be of equal strength and

firmness naturally, the one which comes to market free from dirt, seed, and leaves, and not cut nor curled in the gin, will always command much the best price.

In regard to the deterioration of cotton, it is the opinion of our oldest farmers that the quality has not fallen off, neither has there been so much false packing as there was some years ago.

Very respectfully,

E. BOUDINOT COLT.

Hon. CHARLES MASON,
Commissioner of Patents.

BOSTON, MASS., *July* 12, 1853.

SIR: In answering the queries respecting harvesting, ginning, packing, and manufacturing cotton, I can afford you but partially the desired information. I am not a manufacturer myself, and it has been only by my professional services as a civil engineer that I have become acquainted with the general operations in the manufacturing of cotton cloth. I have made inquiries, however, of those who have been agents of cotton manufacturing companies, and the results of these, limited and incompetent as they are, are given below.

It is apparent that we, at the North, cannot be very familiar with the growing or harvesting of cotton,; but, in relation to the first query, I am informed that the fibre in the same boll or lock does *vary* in length, supposed to be owing to the more sterile or sandy and dry condition of the soil on which it is produced—that on rich soil, and less parched by heat, the fibres are of more *uniform* length before they are separated by the gin.

As to the second query, I learn that the per-centage of loss on the gross weight of cotton is from 10 to 13 per cent.—the extremes being in some instances below and above these limits. The loss here referred to is the difference in weight between the cotton as purchased and paid for (that is, invoice weight) and the weight of the cloth manufactured from it. This loss or waste of, say 11½ per cent. on an average, arises from various causes; and as no miller goes into detail on this point, there is no record of the particular losses in the different stages of the material whilst passing from one machine to another. What I give you on this head, however, is mostly conjectural; still, it proceeds from some of our best informed agents. It is supposed that the ropes and bagging make of this 11½ per cent. loss—4½ per cent. if it is Kentucky bagging, and more if of Manilla bagging. The picker waste is put down at 2½ per cent., and here will probably be found the bulk of grit and sand. The carding machine will yield about 2 per cent. of the whole weight in dust, leaves, and motes. Of the residue, it will be difficult to decide without an experiment, which it may not be necessary to make. There is a loss of stock in the spinning, drying, and weaving rooms, and in wiping and cleaning the machinery, whenever it is convenient to use it. The loss in weight from leaves is not so great from their own gravity as from the mischievous effects they produce in the spinning and in adhering to the fibre. If extricated they carry off many full-length filaments, and if retained they give

the cloth a rough and unsightly appearance. The leaves are brittle in their nature, break into many pieces, and are very tenacious of their position in the cotton. They produce specks in the cloth, and are at last got rid of by shearing.

The fourth query, relating to loss from shortened or divided fibre caused by ginning, must be answered by referring it to that residue of loss of which we have no particular account. And as to the strength or durability of fibre being affected by the ginning process, I am unable to inform you. This much, however, has been said—that from some cause—say from a damp or matted condition of the cotton when put into the gin—the fibre gets doubled, knotted, or kinked; and this condition, from whatever cause it may arise, affects the threads and is continuous in some degree, gives a cloudy aspect to the yarns, and shows itself at last on the surface of the cloth, and gives it an unfavorable appearance.

Lastly. "The general condition of cotton staple as to length and strength," has *not* "deteriorated within the last twenty years."

Respectfully yours,

JAMES F. BALDWIN.

The following letter was transmitted to the Department of State by George N. Sanders, esq., United States consul at London, from Thomas Bazley, President of the Chamber of Commerce of Manchester:

CHAMBER OF COMMERCE AND MANUFACTURES,
Manchester, February 28, 1854.

SIR: This morning I had the honor of receiving your communication and inquiry of yesterday.

To the simple question, "Do the manufacturers of Sea Island cotton assort it by the lock," I can give the positive reply that they do not; nor would it, upon an extensive or practicable scale, be possible for them to do so. The spinners of fine Sea Island cotton of course esteem the longest staple as the best, and in all their processes they get rid of as much short fibre as they can, and preserve unimpaired all the long fibres. Essentially, the art of the spinner consists of disentangling the fibres; in freeing them from all extraneous substances and impurities; in securing those which are the longest; in obtaining them of equal lengths; and, finally, in placing them parallel, so that they will freely and evenly pass each other in the subsequent process of elongation into a line or thread of yarn.

From my own knowledge, the cotton of Florida is of an excellent and desirable quality for the spinner; but it has been sent to the market in a "craply" or knotty condition, which has greatly diminished its value. I have seen some cotton from that State, cleaned and prepared by the "McCarthy gin," which I believe has been increased in value by that preparation to the extent of 20 per cent. That this gin applied to Florida cotton would be a great advantage, does not admit of a doubt.

If the cotton planter would always recollect that the spinner requires *only pure, even, and disentangled* fibres, I have no doubt that he would

save himself much trouble, and increase the value thereof; and if he could classify the fibres according to their length, and pack the cotton in bales, with equal and assorted fibres, a further advantage would be the result.

At any time I shall be most happy to afford you any information upon this all-important subject which I may possess.

I have the honor to be, sir, your most obedient servant,

THOMAS BAZLEY.

GEORGE N. SANDERS, Esq.,
Consul of the United States, London.

WASHINGTON, D. C., *March* 16, 1854.

SIR: In answer to circulars issued from this Office asking for information upon the subject of the growth and manufacture of cotton, several specimens of cotton in the boll have been received, which have been handed to me for microscopic examination. I had previously given you my views as to the importance of a careful examination of the character of all the textile materials of this country; and as circumstances have brought up questions connected with the fibre of cotton, it seems most convenient to commence with that substance.

The number and variety of the specimens furnished thus far, have been quite too small for the required purpose; and it will be proper to address circulars to manufacturers and producers, calling for specimens of the known varieties in all the different conditions, from the boll to the manufactured article, of every degree of fineness. Meanwhile, the following question has been asked: "Does the product of fibre of an individual seed exhibit an approximate uniformity in its length before separation by the gin?" The information obtained in attempting to solve this question, I now proceed to give at length.

Before making any measurement, I thought it worth while to ascertain how much was already known upon the subject. After pretty thorough search, I could only find the following passage in "Uri on the Cotton Manufacture of Great Britain:" "They (the filaments) vary in length from half an inch to one inch and three-quarters." This and other authors give numerous measurements of the breadth of the fibre; but for some reason, the exact, or even approximate length of staple of the different varieties of cotton, appears to have been considered a matter of no importance. From the communications made to the Office, it would seem that even those who have most to do with the material, have no very definite information upon the subject.

As the object in view was to obtain the length of the fibre in the condition in which it is brought to the gin, the method adopted was to measure every filament that was drawn out; and as care was taken in the separation, most of the staple was uninjured. It is not pretended that every filament was unbroken—in fact, the delicate taper ends were sometimes wanting; but no one was neglected, in order that a fair representation might be made of the available length before ginning. Of course, the most perfect method of conducting that operation could do no more than leave the cotton of the same length.

For the purpose of measurement, the filaments were gently extended

upon a glass plate slightly greased or moistened, and the finger was pressed several times over the whole length to remove the curl. This simple operation consumed more time than might be supposed, as the twist of the filament is very strong in the Sea Island. The measurement was made by dividers, and a diagonal scale to hundredths of an inch. As there always remains more or less of twist in the fibre, the length recorded must be slightly under the truth, and the last figure must be considered as only approximate. The specimens examined were, Georgia Sea Island, three parcels—and one of short-staple "top-cotton," or late cotton, not opened at the time of frost. None of the bolls of the "Sea Island" were fully opened, and it is therefore to be presumed that they had not obtained their full growth.

In order to ascertain more exactly the length of staple in different parts of the same boll, the contents of a single cell that had not yet opened were carefully removed, and a number of filaments drawn from the top, the base, and the middle, respectively; the measurements were separately averaged as given below. Each set of measurements is of fibres drawn from the same boll, or from the same part, and it is to be remembered that all were measured that were drawn out, (the Georgia Sea Island, No. 2, excepted.) The measurements are in inches and hundredths:

Georgia Sea Island, No. 1.				Georgia S. I., No. 2	Georgia Sea Island, No. 3.				Top cotton.	
						Not open—all from same boll.			Open—same boll.	
Open.	Partly open.	Open.		Open.	Open.	Base.	Top.	Middle.	Base.	Top.
1.56	1.62	1.34	1.55	1.48	1.30	1.22	0.87	1.16	0.93	1.00
1.63	1.61	1.71	1.57	0.84	1.32	1.24	1.06	1.40	0.94	1.07
1.59	1.75	1.13	1.53	1.57	1.45	0.78	1.34	1.23	1.18	0.70
1.77	1.40	1.22	1.53	1.61	1.10	1.30	1.23	1.46	1.12	1.08
1.77	1.23	1.16	1.35	1.60	1.33	1.17	1.30	0.81	0.97	1.17
1.56	1.34	1.13	1.53	0.98	1.60	1.04	1.50	1.69	1.09	1.12
2.07	1.41	1.17	1.55	2.07	1.50	1.00	1.18	1.26	1.03	1.15
1.47	1.29	1.43	1.77	1.68	1.31	0.88	1.13	1.32	0.98	1.06
1.50	1.61	1.40	1.36	1.58	1.54	0.89	1.07	1.27	0.96	1.07
1.38	1.56	.....	1.45	1.69	1.51	1.24	0.72	1.20	0.92	1.13
1.19	1.29	.....	1.47	1.60	1.61	1.03	1.33	1.12	0.98	0.96
1.75	1.37	.....	1.10	1.48	1.56	1.25	1.00	1.27	0.72	1.05
1.63	1.54	.....	1.65	0.83	1.22	1.24	1.29	1.51	0.91	0.95
1.62	1.66	.....	.....	0.88	1.60	1.26	1.40	1.38	1.16	1.09
1.54	1.40	.....	.....	0.97	1.36	1.33	1.39	1.24	1.14	1.19
				1.44	1.03	0.95	1.39	1.28	0.97	0.92
				1.44	1.50	0.96	1.27	1.11	1.11	1.07
				1.22	1.50	1.20	1.44	1.43	1.05	1.05
				1.08	1.51	1.30	1.27	1.26	1.17	1.12
				1.58	1.61	1.31	0.77	1.44	1.05	1.11
Av. 1.60	1.47	1.30	1.49	Av. 1.33*	Av. 1.42	1.13	1.18	1.27	Av. 1.02	1.05

It would be necessary to increase the number of these measurements to several thousands, to get any very specific information; but from what has already been done, we may very safely draw the following inferences:

The length of the perfect filaments taken from the same boll is very uniform.

* These measurements can hardly be considered as giving a fair representation of the true range of the length of the fibre. The staple is tender, and the specimen seems to have been roughly handled. In drawing out the fibre, a few very short fragments came out, which were not included in the measurement. The set is retained as it has its value, showing an extremely unfavorable case. It is presumed that all the low measurements were upon fragments.

In reality, some of the long ends of the fibres are broken before the cotton can reach the gin, and this uniformity no longer exists to the same extent.

The average length of the staple of mature Sea Island cotton, of the kinds examined, as it goes to the gin, must be between an inch and a half and an inch and three-quarters.

In extreme cases the length may vary four-tenths of an inch from the average; but the larger proportion is within one-fourth of an inch above or below the average.

The unripe cotton is not subject to any greater variation than the ripe.

There is a *probability* that the fibre taken from the base of the boll is the shortest, and that from the middle the longest, while that from the top is between the two, the variation, however, being very small.

As far as can be seen from a single instance, the short staple seems to be remarkable for its uniformity in length. The gentleman who forwarded this specimen supposed from its immaturity that it might show varied lengths of fibre—in reality it exceeds all the other specimens in equality. A slight examination of these cottons under the microscope shows that each has its distinctive character, and that the Sea Island may differ in its varieties as much as some Sea Island differs from some upland.

The adaptation of the different kinds of staple to different kinds of manufacture is much more intimately connected with the minute characters of the fibre than is generally known; for instance, the peculiar character of the Sea Island does not depend so much upon its greater length, nor upon its fineness, as upon its cord-like or "spiral" structure.

Again: the flat or ribbon-like varieties differ widely from each other, some of them showing, even in their flattened parts, an approach to the spiral structure.

Such peculiarities can only be described and made available after the examination of a large number of specimens, and these should include every kind of cotton, from situations differing as much as possible with respect to soil and climate.

Foreign cottons should be examined both before their introduction and after cultivation, with a view to ascertain the influence of climate. A few seeds of a remarkable specimen of the cotton from the Navigators' island have been distributed. A sketch of this fibre in its original condition you have seen. It will be a matter of much interest to determine what changes will be caused by culture in this country.

To those forwarding specimens for examination, it might be proper to mention that one or two bolls will, in most cases, be sufficient—one may be unripe, but the other should be in the proper condition for gathering. They should be dried before being put up, but not handled more than necessary. The name of the variety should be given, and the source whence the seed was obtained; the kind of soil upon which it was grown should also be described. It would also be desirable that the planter should state whether the specimen was considered as above or under the average quality of the crop. Poor and degenerate specimens, if the circumstances of soil, culture, &c., were well described,

might yield much information. Even the contents of a single cell might be forwarded in a letter, if carefully detached.

It can readily be seen that the information collected at a very small cost, might, when properly digested, be of the utmost value to those interested in this staple, to the planter as well as to the manufacturer. It will give me the greatest pleasure to render any assistance towards carrying out your views in this matter.

Yours respectfully,

GEORGE C. SCHAEFFER.

Hon. CHARLES MASON,
Commissioner of Patents.

REMARKS ON THE COTTONS OF INDIA.

[From the reports of the juries of the Exhibition of the works of industry of all nations at London, 1851.]

The collection of raw cotton exhibited by the Honorable East India Company is, as might be expected, large and highly interesting. It consists of a series of samples of the indigenous cottons of various parts of the Indian empire, and samples of the cottons raised in the various government experimental farms during the last thirty years, illustrating the effects produced, and the improvements effected, by the numerous attempts which have been made during that period to improve the cotton cultivation of India.

In considering the native cultivation of cotton in India, it must be remembered that, besides the exports to Europe, very large quantities have every year been raised for home consumption by the native manufacturers, and for exportation to other Eastern countries, especially China; the latter alone having till within the last few years generally exceeded the entire annual quantity exported to Europe. Thus, during the ten years preceding 1833, the quantity of raw cotton exported from India to England was about 250,000,000 pounds; whilst in the same period the quantity exported from India to China, &c., was about 540,000,000 pounds. On comparing together the average total quantity of cotton imported into Great Britain in the years 1830, 1840, and 1850, from the United States and from India, it will be found that while the former during those three periods has increased in about the ratio of 500,000 bales, 950,000 bales, and 1,200,000 bales, the latter has increased in the ratio of 67,000 bales, 163,000 bales, and 300,000 bales; showing, therefore, that, large as the annual increased importation of American cotton into England has been, the increased consumption of East India cotton has, in proportion, augmented even more rapidly.

Of the chief varieties of native India cotton, it may be generally observed, that, though in some cases the fibre is beautifully fine, it is invariably short, generally badly cleaned, and too often injured, by careless collection, bad packing, and faulty inland transit. It must be borne in mind, that these short-staple cottons of India cannot be compared with the long-staple cottons of the New World; they are, in fact

quite different fibres—they must be treated in a different manner, and their uses are perfectly dissimilar. The question of how far long-staple cottons can be advantageously cultivated in India is perfectly distinct from that of improving the production of short-staple varieties. The real practical question to be considered is, not whether the East India cottons can be made to compete with the long-staple American cotton, but whether, by care and attention, by judicious cultivation, improved mechanical contrivances, and the application of skill and perseverance, it may not be possible so to improve the common East India cotton as to give to it those characters and properties which will render it of more value to the manufacturer, by enabling him to use it even more largely, and with greater profit, than he is able to do at present.

On examining the samples of the native indigenous cottons of India, the chief causes of their inferiority are evident: No care nor skill in the cultivation, of course, will render the fibre of short-staple cotton like that of the long-staple variety; but, in many cases, the fault is not the shortness of the fibre, but that the cotton has been ruined after it has been grown and ripened. Either by bad management the staple is broken, or by exposure to the weather, and by the addition of dirt and impurity of all sorts, its value is most materially diminished. The difficulty rests not so much with the cotton as with the cultivator and with the middleman. The indolent habits and the dislike of the former to trouble of any sort, stand more in the way of improvement than anything else; whilst the want of proper encouragement to the native to persevere, and, in some cases, the opposition of the Brahmin, combine to prevent any real progress. In those cases where care and attention have been paid, the native cottons sent over are excellent; and there is no doubt that their value will slowly and steadily increase in the English market, if the cotton be sent to market clean and in the state in which it is gathered.

From the samples of experimental cotton, illustrative of the various attempts which have been made to introduce the cultivation of American cottons into India, it is obvious that, though the introduction of Sea-Island and the other long-staple American cottons may, for the most part, be said to have failed, yet the cultivation and improvement of the New Orleans cotton in India, (which, though not the finest, is certainly the most valuable cotton in the world,) have been attended with very considerable success. The experimental cottons grown from New Orleans seed at the government farms from 1830 down to the present time, prove most satisfactorily that any quantity of good, sound, useful cotton may be imported from India, and that it only needs time and perserverance to give it a high place in the estimation of our manufacturers.

Note.—That Great Britain can be supplied with cotton by India, so far as regards the soil and the amount of light, heat, and moisture of that country, provided sufficient skill could be brought to the grand point of good cultivation, there cannot, for an instant, be a doubt. But, owing to difficulties of a social and political nature, India cotton, from its inferior quality, owing mainly to imperfect cultivation, generally finds but little favor in the eyes of British manufacturers. Its short staple renders it unfit for the iron claws of a machine, however suitable

it may be for the delicate fingers of an Asiatic; and its foulness, owing to slovenly picking and packing, seriously diminishes the price it would otherwise secure.

It is well known that the London East India Company, for some years past, have directed their attention to this great national object. An abundance of funds have been supplied, and improved machinery sent to India, as well as experienced American planters, who have operated under the charge of intelligent agents; and still the result has fallen far short of what sanguine persons had anticipated. It has been supposed that the inveterate customs, national habits, fixed prejudices, local difficulties, and all that *vis inertiæ* which marks the Hindu population, would be overcome by the importation of a few paid agents and some first-rate cotton gins. No mistake can be greater. India is not, as is imagined by many, a conquered country, to be ruled as easily as an English county. Asiatic princes have given way before British soldiers, but the governed, at heart, remain what they ever were. The object of these people being to keep their subjects in a state of abject dependence on themselves, it is of the highest importance to their interests that no foreign government should be allowed to elevate their condition. In illustration of this, it may be stated that a quantity of the seeds of the New Orleans cotton-plant was obtained some time since and distributed among the villagers of Mysore. But it was found that the Brahmins discouraged the cultivation, as it would cause the disappearance of the native plant, and therefore the "evil eye" would be upon all their efforts. To insure the truth of this prophecy, men, in blanket coats, were sent into the fields at night, and were seen uprooting the young plants. From this it may be inferred that it is not the British government that can produce the necessary changes, and least of all an Indian government. Directors and capitalists may patronize, men of science may suggest, and culturists may execute, but all in vain, so long as things remain as they now are—under Hindu influences and foreign rule.

D. J. B.

CONDENSED CORRESPONDENCE.

Statement of Hon. E. Crawford, *near Blakely, Early county, Georgia.*

Cotton, in this region, is much the most important product in reference to profit or income. Last year I estimated the cost of producing and preparing a crop of cotton for market, at the rate of about 6 cents a pound; when the sum is less than this, the crop does not pay common interest. If produced on soil of average fertility, the range of production in clean marketable cotton per acre may, I think, be stated at from 100 to 600 pounds, and the average not exceeding 200 pounds.

Statement of M. W. PHILIPS, *of Edwards's Depôt, Hinds county, Mississippi.*

The "cotton caterpillar" has been seen here for many years—not to do much injury before 1846. The "rust" has been seen here many years; I remember it well when a boy; but the "rot" was unknown to us, to any extent, except through report and reading, before 1852.

Though, as I said, the worm has been with us for some years, I have seen no damage by the rot before 1852–53. In 1845, I saw acres and acres of the cotton-plant shorn of every leaf—bolls destroyed and injured in all grades; yet I saw not a specimen of the "black" or "brown rot." Last year I examined hundreds of bolls, some with a mere speck, some without an external blemish; yet all the pods inside were in a state of decay. I examined as carefully as I was able for an external injury.

A friend living some ten miles from me, who is an observer, told me that the plant had set more fruit than it could mature, and that nature was only destroying the surplus crop. This could not be so in all cases, for plants within a few feet of each other had but few bolls injured, whilst others carried not a boll to maturity. Again, on land that was of a "mulatto soil," and inclined to rolling, had most rot; whilst level and "marsh land" had most rust. I have seen no more rot on parts of fields where the "boll-worm" depredated most, or where the caterpillar begun, than where they had not been. My friends and correspondents were, and are now, searching for seed where there had been no rot, expecting future crops to be ruined, as in about the year 1818. I have not done so, but have taken my pork-brine and used it freely on seed before planting, drying off with plaster, lime, or ashes. I have not had half so much rot. I do not attribute my escape to the salt, nor do I know anything of this matter.

I have seen the "rust" more or less in different lands for twenty years. Sometimes of a dry year, it would disappear after rain, or cease its ravages. Again, when on flat lands, of a wet season, it would cease in dry weather. This year my brother-in-law, A. K. Montgomery, near me, who has been more injured than any one on our rich level lands, tried sowing salt broadcast. He has had much less rust than usual, and has come much nearer making an 1852 crop than any one near him. I tried not only salting my seed, but drilling in the row from two to four bushels to the acre. I have seen much less rust or rot; but there has been much less everywhere, so far as I have seen or heard. Here again I confess my ignorance, unless I contend—as I have less rust, and planted the same land more years without it; as I vary the crops on the same land more than others—it is rotation benefits me, and the land "tires" of the cotton-plant, which is only saying there is mystery about it all.

I have tried guano, bones in the crushed and dissolved state, superphosphate of lime, and gypsum, in various quantities; but this year has not been favorable for such experiments—none have paid this way.

North and South may keep up a muss as long as life lasts; but this one thing is a fixed fact—that, next to bread, cotton is of more importance to our country, aye to the world, than any one thing; and the gen-

eral government could with propriety appropriate, say $10,000 for the express purpose of testing what is best for cotton culture. The world, including the cotton-growing negro, as well as the rest of mankind, now see that the cotton culture can be healthy even if full crops be made every year; and that, though the ablest civilian of our age thought we would be ruined by 3,000,000 pounds too much increased culture, a small planter was correct in saying our prosperity was dependent on full crops and fair rates. The cotton region can make a crop at a will to do business, at 8 cents, whereas other parts cannot live at less, perhaps, than 10 cents; which would bring in much competition from abroad. Let cotton be at 8 to 10 cents, and those countries requiring 10 to 12 cents a pound go to other work.

Statement of JOSHUA HARRIS, *of Welches's Mills, Cabarras county, North Carolina.*

Cotton, the great staple of this county, has fallen so short of the last crop, that there will be only about half as much made as was made here in 1852. A great frost made its appearance on the 18th of October, and killed it so badly, that what will even open will be of little value. I would say that there will be but 200 pounds of clean cotton to the acre. The price, at present, at the nearest market, is only $9 per hundred. Cotton is raised as far north as this; but we are on the line between a cotton and no cotton country. The seasons are too short, with cold springs, which render it difficult to get a good early stand.

Statement of A. M. HANNA, *near Danville, Montgomery county, Texas.*

The fact that I made 51 bales of cotton, (Dean seed,) 500 pounds to a bale, 1,800 pounds to the acre, and 17 bales to each hand, can be well authenticated by all of my immediate neighbors. I had seventy acres of "hog wallow" prairie land, of a black and stiff soil, cultivated chiefly in cotton, oats, sweet potatoes, and Indian corn.

I planted my cotton very early, preparing the land in the best manner, and had no drawbacks to contend with from crab-grass, insects, unpropitious weather, nor of any other kind. It was the second crop in the field, on which no cattle had been permitted to run, and had been made mellow and easy to work by copious rains and winter frost. It was well worked throughout the season with three hands, including myself, with four hands to save the crop.

The yield per acre of my other crops was 40 bushels of corn, 300 bushels of sweet potatoes, and 20 bushels of oats. No manures ever used.

FLAX AND HEMP.

Common flax is an inheritant of temperate countries, from the neighborhood of the tropics to the polar circle, wherever the temperature of the climate is not depressed by mountain elevations; but it is not

known to what region it owes its origin. It may be thought strange, perhaps, by some, that this plant should thrive in the hot valley of the Nile, and in regions so cold as those of Russia and Norway, in latitude 65° north; but this circumstance is obvious when we consider how rapidly this product completes the cycle of its growth, and that in the north of Europe it is an object of culture in summer, and in Egypt only in winter. In the latter, it is sown in December or January, in the fields just quitted by the overflowing Nile, and is harvested in April or May; in the north of Russia, it is sown in May, and harvested in August or September; the conditions of the temperature of the two places being nearly the same.

The history of this plant, which has long served as the medium of clothing myriads of human beings, of wafting ships from sea to sea, of conveying thoughts from man to man, from nation to nation, and of diffusing light and knowledge to the utmost parts of the earth, like many of our products, is involved in lost antiquity. Early mention is made of it in the sacred volume, where it is said that "hail destroyed the flax and barley," when Moses was striving in vain to move Pharaoh to allow the departure of the Israelites. The Egyptian mummies are wrapped in linen—an undeniable proof of the use of flax in the remotest past. It was also known to the Romans, as Pliny, who wrote more than eighteen hundred years ago, remarks on the wonder that so great a power should be developed from so small a seed as that of flax, in producing a plant which could be the means of bringing Egypt so near to Italy, in allusion to the fact that commerce and navigation depended principally upon its production; but, at the same time, grew angry, that men should venture to brave nature by setting sails on their vessels, and cursed those who invented the mariner's art, as well as those who brought it to pass that men should perish by it, not only on the earth, but on the sea, without finding burial.

Hemp, which is supposed to be a native of India, but long since acclimatized and extensively cultivated in various parts of Europe and America, also forms an article of primary importance in commerce, and is of extensive utility.

Both flax and hemp were introduced into the British North American colonies soon after their settlements by Europeans. The former appears to have been cultivated at New Netherland as early as 1626, as it is mentioned, among other products sent to Holland by the colonists on Manhattan island that year, as an evidence of their prosperous condition.

According to the records of the "Governor and Company of the Massachusetts Bay, in New England," the seeds of hemp and flax were ordered to be introduced into that colony, in 1629. In about the year 1745, some emigrants from the north of Ireland came to Massachusetts and established an improved manufacture of linen and other "spinning work." Many trials had been previously made in that colony for raising hemp, but the soil was not considered sufficiently strong. Two acres of cow-pen land would produce a ton of fibre; but it soon exhausted the soil. Flax was cultivated in considerable abundance in that State soon after the war of independence, particularly at a distance

from the coast. Manufactures were established at Salem and Springfield, in about the year 1790, for making sail-cloth.

Hemp and flax were annually cultivated, spun, and woven, by Captain Matthews, of Virginia, prior to 1648. Bounties were offered for the production of hemp in that colony in 1651, and on flax in 1657; but on the cessation of the bounties the culture declined. In 1662, each poll in Virginia was required to raise per annum six pounds of linen thread. The Irish immigrants who came to Londonderry, in New Hampshire, in 1719, soon after commenced the manufacture of linen cloth and thread, which was afterwards entered into by others, and large quantities were sold.

In 1730, the Assembly of Pennsylvania passed an act for the encouragement of growing hemp, showing that some progress had already been made in its manufacture. The Irish settlers of that colony manufactured considerable quantities of linen, besides enough for their own consumption.

In 1733, the British Parliament granted to the patentees of Georgia, for the encouragement of the culture of wine, silk, cotton, wool, cochineal, flax, and hemp, £10,000; between that period and 1743, £120,000; in 1749, £5,324.

Early attention was paid to the cultivation and manufacture of flax and hemp in Ohio, Kentucky, and Indiana. Between November 24, 1810, and January 24, 1811, there were transported down the Ohio, in flatboats, 400 pounds of hemp, 479 pounds of tarred rope, 20,784 pounds of bale-rope, 154,000 pounds of rope-yarn, 1,484 pounds of thread, 27,700 yards of bagging, and 4,619 yards of tow cloth. Extensive factories had already been established at Louisville, Lexington, Shelbyville, and Frankfort, in Kentucky, where considerable quantities of cordage, bagging, &c., were made for transport and domestic use.

The Harmonists of Indiana erected a mill prior to 1796, in which they manufactured 4,000 pounds of flax and hemp in 1809. Since that period the rich lands of the Western States have been more or less cultivated with hemp, which is now produced as a staple crop.

The fibres of flax and hemp have never been produced in this country in sufficient abundance to enter into our foreign commerce, nor for domestic use in the finer articles of wearing apparel, except thread and lace. Liberal premiums have been offered by the American Institute of New York and other institutions, for the manufacture of finer fabrics; samples of which have been produced from time to time that reflected much credit on those who made them, and which were pronounced equal to any imported.

There were exported from New Jersey, in 1751, 14,000 pounds of hemp; from Savannah, in 1770, 1,860 pounds. The amount of flaxseed exported from Philadelphia, in 1752, was 70,000 bushels; in 1767, 84,658 bushels; in 1771, 110,412 bushels; from New York, in 1755, 12,528 hogsheads.

The amount exported from the British North American colonies, in 1770, 312,612 bushels; from the United States, in 1791, 292,460 bushels; in 1800, 289,684 bushels; in 1810, 240,579 bushels.

The quantities and values of flax and hemp and their products ex-

ported from the United States, of domestic growth and manufacture, within the last thirty-three years, are exhibited in the following table:

Years.	Hemp.	Value.	Flaxseed.	Value.	Linseed oil.	Value.	Linen cloth and thread.	Bags,&c.
	Cwt.	Dollars.	Bushels.	Dollars.	Gallons.	Dollars.	Dollars.	Dollars.
1820–21	.....	.....	264,310	420,202	16,370	.....	.....	.....
1821–22	.....	.....	289,111	392,772	18,527	.....	.....	.....
1822–23	.....	.....	232,761	262,314	13,594	.....	.....	.....
1823–24	.....	.....	377,226	504,327	13,924	.....	.....	.....
1824–25	.....	.....	234,042	234,845	9,022	.....	.....	.....
1825–26	.....	.....	117,672	144,908	9,117	.....	2,937	5,444
1826–27	.....	.....	124.287	188,606	9,673	.....	11,084	5,364
1827–28	.....	.....	118,492	144,095	9,200	.....	5,335	3,365
1828–29	.....	.....	68,758	113,040	5,322	.....	2,166	14,954
1829–30	.....	.....	115,762	180,973	3,914	.....	2,152	1,779
1830–31	.....	.....	120,702	216,376	8,643	.....	231	2,599
1831–32	.....	.....	57,537	123,036	4,495	.....	1,570	2,685
1832–33	.....	.....	117,292	228,300	3,159	.....	5,964	18,985
1833–34	.....	.....	187,468	281,990	15,728	.....	4,889	6,162
1834–35	.....	.....	228,863	451,886	2,370	.....	795	1,575
1835–36	.....	.....	123,926	250,182	1,785	.....	6,720	7,385
1836–37	.....	.....	33,147	50,553	4,660	.....	18,422	29,898
1837–38	.....	.....	35,651	55,954	5,604	.....	1,244	2,146
1838–39	.....	.....	66,781	161,896	3,253	.....	2,010	2,047
1839–40	.....	.....	76,970	120,000	3,968	.....	7,114	1,123
1840–41	.....	.....	32,243	50,781	10,072	.....	2,764	10,636
1841–42	.....	.....	18,354	34,991	4,367	.....	.....	1,038
1842–43	.....	.....	35,002	49,406	4,185	.....	.....	326
1843–44	.....	.....	15,006	23,749	6,327	.....	.....	311
1844–45	.....	.....	178,007	81,978	7,416	.....	950	13,812
1845–46	.....	.....	107,959	165,438	8,656	.....	1,364	10,765
1846–47	.....	.....	968	1,346	6,701	.....	477	5,305
1847–48	.....	.....	1,017	1,584	11,066	.....	495	6,218
1848–49	.....	.....	4	4	7,797	.....	1,009	4,549
1849–50	787	5,633	2,501	4,040	13,448	.....	1,183	10,593
1850–51	4,769	29,114	9,185	18,988	20,193	.....	1,647	6,376
1851–52	3,067	18,649	31,304	56,187	18,073	14,981	5,468	8,154
1852–53	2,413	18,195	3,932	7,719	18,266	15,468	2,924	13,860

According to the census returns of 1840, there were raised in the United States 95,251¾ tons of flax and hemp; of 1850, 34,871 tons of hemp and 7,709,676 pounds of flax, besides 562,312 bushels of flaxseed; showing a diminution in the aggregate growth of fibre of about 56,000 tons. The amount of hemp raised in the Union in 1853, may be estimated at 34,000 tons; and that of flax, 8,000,000 pounds, besides 58,000 bushels of flaxseed; which, in reckoning the hemp at $100 per ton, the flax fibre at 10 cents a pound, and the seed at $1 25 per bushel, would be worth, in the aggregate, $4,272,500.

CONDENSED CORRESPONDENCE.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

Flax is raised with us more for its seed than for its lint. The general average of seed to an acre, sown broadcast, is five bushels. The substitution of cotton fabrics for those in which flax formerly entered largely into composition, is rendering this article, except for its seed, an object of very little attention to our farmers. Besides, it is considered a very great exhauster of the soil, and justly so, for it not only returns nothing to the earth, but the roots, when pulled up, leaves the ground exposed in perfect nakedness to the rays of the summer sun. The seed is worth here about $1 25 per bushel.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Flax, to get a good, fine, heavy coat of lint, should obtain its growth before the hot season comes on. It should be sown upon very rich and rather moist land, early in April. If it is desired to get a fine quality, suitable for good linen, it is necessary to sow quite thick, say three bushels per acre; but if it is only required for canvass or cordage, about two bushels are sufficient.

My estimate for an acre, based upon the experience of only three or four crops, is as follows:

Ploughing once	$1 38
Harrowing twice	76
Seed, two bushels	2 00
Sowing	13
Pulling and binding	2 00
Threshing off the seed	1 50
Rotting by the dew	3 00
Dressing by hand 400 pounds, at 6 cents per pound	24 00
Total	34 77
Deduct for 10 bushels of seed, $10	10 00
	24 77
Product per acre, 400 pounds, at 15 cents	60 00
Profit per acre	35 23

Statement of JOHN B. YOUNG *and* JAMES DE MOTT, *of Ovid, Seneca county, New York.*

Flax has been cultivated with us heretofore for the seed only, and the stalks burned; but the straw is now worth $5 per ton, for the purpose of manufacturing into lint, and is sent East to be made into cordage, and for other purposes. This, however, is rather an experiment

than otherwise. Should it succeed well, it will give a new impulse to the cultivation of this crop.

Statement of JACOB KNOOP, *of Elizabeth, Miami county, Ohio.*

Flax has been cultivated with us pretty extensively, for the seed only. No use is made of the fibre, or lint. The price of flaxseed is from $1 to $1 25 per bushel. Average yield, about 10 bushels to the acre.

Statement of JAMES DURLEY, *of Platteville, Grant county, Wisconsin.*

A considerable quantity of flax was cultivated last season in this county, and turned out well. The average yield of seed to the acre was about 15 bushels, which is worth $1 per bushel at the mill.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

Flax has been cultivated to some extent in this county, and an oil-mill has been erected near Fond du Lac. I have sown about two acres the past season; but I fail to be convinced that it will be as profitable as some other products. The yield of seed with me was about 8½ bushels to the acre, worth here about 88 cents a bushel. Quantity of seed sown, half a bushel to the acre. The lint is generally thrown away, but would pay sufficiently well if saved.

Statement of ALEXANDER O. MCGOWAN, *of Berlin, Marquette county, Wisconsin.*

An increasing interest seems to be taken in the cultivation of flax in this region. Considerable quantities were successfully raised in Waushara and Marquette counties, and it is considered a paying crop for the seed alone; 86 cents at home, and $1 06 at or near Milwaukie, having been offered per bushel.

From the information which I have been able to obtain regarding the growth of flax, last season was indefinite and unsatisfactory, because, necessarily detached and unsystematized, it must be, in so new a country as ours. My opinion of last year is thus far fully sustained, and I have no doubt but, if we had a few flax or scutch mills in every county, and a few spinning mills and bleaching greens in the State, where there is an abundance of water-power for every purpose, we should be able to turn out "Wisconsin linen," perhaps as good and as cheap as the universally admired "Irish linen." All we want is the encouragement of manufacturers; for cheap food and higher wages would soon attract men of energy and skill from the extensive manufactories of Ireland, who are acquainted with every process, and in a short time would be the means of retaining in this country the thousands of dollars that are now annually expended for linen abroad.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Hemp is grown to some extent in this neighborhood. It is not a very uncertain crop, and will yield, as an average, 700 pounds to the acre. Present price of hemp per hundred, $5; cost of production per acre, as follows:

Rent of land	$4 00
Cost of seed, and putting in the crop	4 00
Cutting and stacking	2 00
Rolling, &c.	1 00
Breaking and cleaning for market, &c	6 50
Cost of 700 pounds	17 50
Market value of 700 pounds	35 00
Profit per acre	17 50

Statement of R. HUGHES, *of Fayette, Howard county, Missouri.*

Hemp, with us, requires the dryest and richest land in the State, to insure success. It is best to take new land, and not cultivate it in any other crop. It may be grown on good ground twenty consecutive years, with equal success, allowing for the variation in seasons

The best mode of preparing the ground is to plough deep, and, if dry, as early in March as you can. It should be harrowed as it is ploughed; and if there are clods, they should be pulverized. Let the land lie in that state until about the 20th of April; then plough as above, sow the seeds at the rate of 1¼ bushels per acre, and harrow twice—first with a common harrow, and the second time with a lighter and finer one.

Hemp should not be cut too green, as the lint will be light. The leaves should commence falling, and the stalk be yellow. The common hemp-hook is the best instrument for cutting. The hemp-cradle is used by many, with which one hand will cut an acre per day; but the difference in time is more than lost in the waste of hemp, not cutting it low enough with the cradle.

A hand can save as much with the hook in a good season as he ought to break, or can break, in the cool weather, which is the only time hemp should be broken. A part of the crop should be put down to water in October, the balance early in November. Early watering will be the darkest, but the fibre the softest and strongest. The late watering will be the brightest, but the most harsh and brittle, and consequently not so strong. The average crop is sometimes estimated at 1,000 pounds per acre, which is often made, and occasionally more; but 800 pounds are nearer an average than a higher figure.

Hemp ground is often ploughed after the crop is cut and taken up, to prevent the growth of grass, which only occurs when the crop is failing. This course is evidently injurious to the land. It exposes it to the hot sun at a dry time of the year, from which it receives a weak-

ening, killing influence. The management would be to leave the land undisturbed until spring, with all the litter and stubble on the surface. The stubble, leaves, and under-hemp, will preserve the land from the scorching sun; also from the beating, washing rains in the winter. Then, when the hemp is watered, taken up, and put under the break, there will not be half the amount of dust. If hemp ground becomes too grassy to yield a good crop, the better plan is to sow it in wheat and Timothy in September, and red clover in the winter. Two years in that condition will make a preparation that will cause one acre to produce more lint than two while infested with grass.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

Hemp is one of the most important crops of this State. I have no means of ascertaining the exact quantity raised in Missouri, as a good deal is shipped in other shapes than the raw material. The culture of this great article is increasing, and adding greatly to the wealth of our farmers. The comparative cheapness of our lands, with equal shipping facilities, will ultimately enable this State to outrival Kentucky in the culture of this great staple.

The average product of hemp here is 700 pounds to the acre, and the price varies from $100 to $130 per ton. The usual mode of estimating the quantity of well-grown hemp to an acre, is to note the height of the plant in feet—each foot giving 100 pounds. Thus, hemp nine feet high at maturity will turn out 900 pounds to the acre.

Statement of W. M. JACKSON, *of Fayette, Howard county, Missouri.*

Hemp grows well on our best lands, and is a certain crop. It generally yields from 700 to 1,000 pounds, and frequently 1,200 and 1,400 pounds, to the acre. We sow, early in April, from 1 to 1¼ bushels of seed to the acre; and commence cutting the early sowing the 1st of August. After cutting, it is shocked in the field, and is spread on the same ground to "water" in October and November. It is generally watered or rotted by the 1st of January. Then commences the laborious job of breaking, which requires stout hands. It is sold at the river, or baled and shipped to St. Louis.

The prices of hemp have varied within the last fifteen years from $65 to $120 per ton. At present, it is worth $100 per ton. It is a profitable crop at $100. A succession of crops may be continued without any diminution of soil.

Statement of H. L. BROWN, *of Fayette, Howard county, Missouri.*

The culture of hemp is on the increase, and does not impoverish the soil. It can be grown successively upon the same ground for many years without detriment to the land. The average yield per acre is 800 pounds, at a cost of 3 cents a pound.

CULTIVATION OF THE OSIER.

The uses to which the osier may be applied are so varied, that it would be useless to attempt to enumerate them here. Being an aquatic plant, and of a rapid and vigorous growth, it is peculiarly fitted for planting on the banks of rivers and streams, for restraining their encroachments, and retaining in its place the soil. The annual shoots, which are of different degrees of length, are used, with or without their bark on, for the different kinds of basket-making, wicker-work, &c. They may also be employed for binding up stalks, flax, and grain, instead of straw. The finer and smaller shoots may be used for tying up trees, shrubs, and vegetables, for the purpose of sending to market in bundles; for confining the branches of trees to walls or espaliers; for tying up standard trees and shrubs into shape; for making skeleton frames on which to train plants in pots; for tying bundles and packages; and for a thousand other purposes, which are familiar to every gardener, or will readily occur to him in practice.

The most vigorous-growing species, adapted for basket-making, is unquestionably the twiggy-willow, or common osier, *(Salix viminalis,)* and it is also the kind most generally cultivated for that purpose. It has no disadvantage, except that in cold, wet seasons, in a high latitude, and in a moist soil, it does not always ripen the points of its shoots. The other kinds, which perfectly ripen the points of their shoots in most seasons, are the red or purplish-twigged osier, *(Salix rubra;)* Forby's willow, or fine basket osier, *(Salix forbyana;)* the deceptive, or white Welch willow, *(Salix decipiens;)* and the stipuled or auricled-leaved osier, *(Salix stipularis.)* The best of these is, perhaps, Forby's willow. The three-stamened-flowered osier *(Salix triandria)* is nearly as vigorous as the common osier. The purple-twigged willow, *(Salix purpurea;)* the yolk-of-egg-colored willow, or golden osier, *(Salix vitellina;)* and the helix or rose willow, *(Salix helix,)* are very desirable species, where small, tough rods are required. A very valuable osier naturally abounds on the Great marsh on Grand island, in Niagara river; but the above-named species are considered as by far the most valuable.

Soil and situation.—The soil for basket willows should be of a deep sandy loam, well drained, and thoroughly prepared; and the situation ought to be low, level, and naturally moist; and if there is a command of water for irrigation, so much the better. It will succeed, however, on a somewhat dry soil, in which the shoots will not only be smaller, but harder, tougher, and more compact and durable, than when grown in a soil that is rich and moist. In dry soils, also, the growth of the plant is much slower than when it has been impelled by an extraordinary supply of water. The best situation, when the object is free and rapid growth, is along the banks of rivers and brooks, that pass through a level country, and on the small islands which frequently occur in the midst of streams; in hollows or swales, also, the soil of which is composed of rich, soft, earthy particles, and which can be laid dry, are the most eligible sites for converting into osieries; and if such can be occasionally soaked with water during the dry months of summer, the situation may be considered as perfect. Completely draining the site for a basket-willow plantation is the first step towards its formation

and the foundation of its success, and consequently, of the profit to be derived from it.

In preparing the ground for an osiery, if the soil be poor, it should be as well dressed with stable dung as if it were intended for a crop of barley or wheat. Lime, as a manure, has been tried; but it was found that the twigs became much fired, or spotted with a sort of canker, and in attempting to bend them, they readily broke at the cankered spots. In no case should a plantation of willows be attempted but in prepared ground; except, perhaps, where a few rows may be introduced upon the brink of a river, or on the top of the banks of ditches, which form in most instances the barrier of waters, where the soil can scarcely be dug or otherwise ameliorated.

Propagation and culture.—All willows may be propagated by cuttings, though some of the more rare Alpine kinds with difficulty take root. Some species also grow very readily from seeds. The cuttings for osiers, which may be grown in nurseries previously to their removal to their final situations, should be made of one-year-old wood, about a foot or sixteen inches in length, cut straight across at the lower end, and in a sloping direction at the upper end. They should be planted perpendicularly in the soil, to a depth of three-fourths of their length, with the earth firmly pressed to them, more especially at their lower extremities. The reason the lower ends of the cuttings are cut directly across, and not sloping like the upper ends, is, that they may form equal callosities all around, and consequently throw out an equal number of roots from these callosities on every side. It has been found by experience that when a cutting is inserted in a sloping direction, roots are protruded nearly equally through all that part which is buried in the ground, unless the soil has become more closely pressed against one part than another. In this case, the roots will there be protruded in greater abundance; and if the soil has not been pressed to the lower extremity, it would probably produce no roots at all at those points, but rot. The upper extremity of the cutting is cut in a sloping direction, for the purpose of shedding off the rain. The top end of the shoot, as far as it appears soft, being unripe, should be discarded, because such wood will only produce weak plants, and will not make so good roots the first season as the firmer parts of the shoots will do. Pieces of two-year-old shoots of the same length as above, and cut in the same manner, may also be used; but these are more expensive, and no better for the purpose than the former.

The distances at which osiers for baskets or wicker work, ought to be planted apart, are 18 inches between the rows, and 12 inches in the other direction. At these distances, 29,040 cuttings will be sufficient to plant an acre. These distances will not be found too near for at least five or six years; but after that period every alternate plant should be grubbed up by the roots, which would leave those remaining at two feet apart in the rows. The best season for planting cuttings of two-year-old wood, in a well-drained soil, is late in autumn, in consequence of which the buds will swell during the winter, and be ready to grow with vigor in the spring; but in a wet soil, and in climates where they are liable to be loosened by winter frosts, cuttings planted in autumn should be made firm a second time in the spring. The

proper time to plant the slips of one-year-old wood, in a high latitude, is a few weeks previous to their natural period of putting out leaves. The cuttings may first be planted in a nursery, and removed the autumn or winter following, or they may be planted at once in the sites where they are finally to remain. In either case, if the soil is not sufficiently moist, due attention must be paid to give them water in dry weather.*

Management.—Osier plantations must be carefully cleaned and hoed every year. Nothing contributes more to the raising of a good crop of twigs, after due preparation of the soil, than keeping them clean. The stools should be annually attended to from the first year of cutting a crop of twigs, by clearing the rotten stumps and not allowing the plants to be over-crowded by the young shoots at their base. When these have become too numerous, they should be carefully thinned out, and also cut down, leaving only one or two eyes at the bottom of each, until they are reduced to such a number as the stool is capable of vigorously supporting until the fall of the leaf. A basket-maker finds one shoot of six to eight feet in length, of more value than four of three feet in length; and one of the former of these dimensions will not so much exhaust the stool nor the land as four of the latter.

The proper season for cleaning and thinning the stocks is in March or April, or a month or six weeks before the osier puts forth its leaves. The reason for choosing this period for the operation is, that if it were performed in autumn, the germs of the buds existing at the base of the small shoots, which have been cleaned off, would swell, in the course of the winter, and be liable to throw out shoots in the following spring; whereas, by delaying the cutting of these till the sap is in motion, the germs remain dormant, and the whole current of sap is taken up by the buds already formed. The cleaning of the plants may be done with a sharp knife, and if it has been regularly attended to from the commencement of the plantation, it is neither troublesome nor expensive. Indeed, this care is deemed necessary, were it only for guarding the plants from the ravages of insects.

Cutting and disposing of the crop.—The proper season for cutting the basket-willow is in autumn, directly after the fall of the leaf. The advantage of cutting at this period is, that the buds which are left to produce the shoots for the succeeding crop immediately begin to swell, and grow in strength during the winter, in consequence of which, they make much earlier and more vigorous shoots in the following spring. As soon as the rods are cut, they are generally tied up in bundles, three feet nine inches in girt; and if they are not intended to be used green—that is, with the bark on—they may be set on their thick ends, in standing water, to the depth of three or four inches, where they may remain during winter and spring, until the shoots begin to sprout, when they are ready to be peeled. Sometimes it happens that osiers are cut with the leaves on, in which case they should never be tied up in bundles, on account of the fermentation that would be produced by binding them closely together in that state. Therefore, they should be set up thinly and

* See Loudon's Arboretum, vol. iii, p. 1456, *et seq.*

loosely on their ends, with their tops leaning against a rod supported on two props.

The operation of peeling is so very simple that it may be done by old, infirm persons, at a stipulated price per bundle. The apparatus employed for the purpose consists of an iron fork, about 16 inches long, with tines or prongs, about half an inch in diameter, placed sufficiently near each other to pinch the osier rods, and tapering somewhat towards their tips. The shank, or large end of the fork, should be sharpened to a point, so that it may easily be thrust into the ground. When the shank of this implement is firmly inserted into the earth, or in a block of wood, the peeler sits down, taking a rod or twig, by the small end, in his right hand, and puts a foot or more of the thick end between the prongs of the instrument, which he then presses together with his left hand, while with his right he draws towards him the rod. By this operation, the bark of the large end will at once be separated from the wood, and by shifting or reversing the ends of the rod, and drawing it through the fork, the peeling will be complete.

The rods, when whitened or peeled, are usually tied up in bundles, the bands of which are 3½ feet long. In a peeled state they will keep better, to wait a market, than if left with the bark on; for it is stated that they never fail to produce a better return, notwithstanding the cost of the labor of peeling, than when sold immediately after they are cut from the stool. In Germany, and also frequently in Scotland, the osiers, after being cut and tied up in bolts, are stacked or kept in an airy shed; and when the bark is removed, it is effected by steaming or boiling them in water. Rods thus prepared are considered to be rather more durable than when the bark is separated, in consequence of the rising sap, and they may be worked up directly after cutting, instead of remaining several months in a useless state.

GRASS, HAY, AND OTHER FODDER.

The hay and fodder crops, including the dried blades, shucks, and tops of Indian corn, as well as the succulent corn-plants and other green forage, cultivated solely for *soiling* or for drying into fodder, chopped straw, the haulms of beans, peas, potatoes, &c., which are by no means inconsiderable, may be ranked among the most valuable of the United States.

In the early settlements of the Atlantic States north of Virginia, the cattle of the inhabitants were chiefly dependent upon the wild indigenous grasses—such as the white clover, herdsgrass, (red-top,) wire-grass, Indian grass, secretary grass, fowl-meadow grass, and the coarser herbage of salt marshes, beaver meadows, and other swampy grounds. In the Middle and Southern colonies, they foraged upon the wild herbage of the country in the same manner as the existing cattle do on the crab-grass of Florida, Carolina, and Georgia, or the buffalo, muskeet, and the grama grasses of Louisiana, Texas, and New Mexico, as well as on wild cane and the leaves, boughs, and the fruit of trees.

Fowl-meadow is described as growing in abundance around Massachusetts bay as early as the year 1629, with large, tall stalks and broad, rank blades, which were much relished by cows, horses, hogs, and goats, and upon which they thrived.

Secretary grass was used for pasture and hay as early as 1670, as will be seen by the following passage by Denton, in his "New York," published that year: "Towards the middle of Long Island," says he, "lyeth a plain sixteen miles long and four broad, upon which plain grows very fine grass, that makes exceeding good hay, and is very good pasture for sheep or other cattle; where you shall find neither stick nor stone to hinder the horse-heels, or endanger them in their *races*, and once a year the best horses in the island are brought hither to try their swiftness, and the swiftest rewarded with a silver cup, two being annually procured for that purpose."

The *crab-grass* or *crop-grass* of the South bears one or two cuttings a year, growing to a height of two or three feet, appearing in April or May, and makes good fodder.

Among the foreign grasses cultivated in this country, the Timothy (herdsgrass of New England) stands pre-eminent. It is said to have received its name from Timothy Hanson, of Maryland, who brought it from North Carolina in about the year 1770. About ten years after, it found its way to England, where it proved well suited to the soil and climate, and received the name of *Phleum pratense*, or "meadow cat's-tail grass." It has been cultivated as a favorite crop for a long time in Sweden and other parts of Northern Europe; but from what part of the world it originated, is at present unknown, as it is nowhere found in a positively indigenous state.

The next plant in extent of cultivation among our forage crops, of foreign origin, is the common "red clover," which has become widely naturalized, and is profitably raised by all good farmers. The precise period of its introduction is not known; but on the authority of Watson, in his "Annals of Philadelphia," John Bartram had fields of it on his place at Kingsessing prior to the Revolution; and according to Darlington, it was introduced into general cultivation in Chester county, Pennsylvania, between the years 1790 and 1800. About the beginning of the present century, clover-seed became an article of export. It was cultivated to such an extent in Suffolk county, New York, that more seed was carried to market from that county than from the whole State besides. It was not uncommon for a farmer to sell 30 bushels of this seed in a year, which, in many instances, brought him more clear profit than all the rest of the produce of his farm. In 1750, the best dairy farmers in Rhode Island cut two hundred tons of hay.

Near Frederick, in Maryland, meadows were irrigated artificially for growing hay, either before or soon after the Revolution, on which our indigenous white clover grew thick and fine. According to the census of 1840, the hay crop of the United States was 10,248,108¾ tons; of 1850, 13,838,642 tons; showing an increase of 3,590,533¼ tons. The crop of 1853 may be estimated at 14,500,000 tons; which, at $10, would amount to $145,000,000.

CONDENSED CORRESPONDENCE.

Statement of T. L. HART, *of West Cornwall, Litchfield county, Connecticut.*

In laying down meadows, clover and Timothy are considered the best grasses. The quantity of seed should be four quarts of each to the acre. The best fertilizer for meadows is a top-dressing of swamp muck, prepared by being placed under the floors of stables, in the milking yards, in the hog-pens, or in a place prepared for the purpose back of the house, where all the suds and wash of the house during the year may be absorbed, and thus saving the best portions of manure the farm affords, which, in ordinary cases, is worse than lost. Any farmer who has peat muck near at hand, and will devote sufficient time to making and saving the above-named manures, may double the products of his farm in five years. After spreading this upon the surface, a dressing of plaster should be applied, at the rate of five pecks per acre.

Statement of B. V. IVERSON, *of Columbus, Muscogee county, Georgia.*

I have now (November 25) a field of one hundred acres, as level as a floor, of a winter grass from 8 to 10 inches high, the seeds of which were sown late in September last, and which more than one hundred head of cattle, with horses, mules, sheep, and hogs, cannot keep down from this time to June next. This grass will keep them all fat throughout the winter and spring. It makes the cows give the greatest abundance of the richest milk, and the sweetest and yellowest butter. It enables a man to have fat beef, mutton, pork, turkeys, and chickens for his table, and will then (the stock being removed) go to seed, and yield from four to six tons of nutritious hay per acre. This grass no "freeze," however severe, ever hurts; no insect troubles it; no overflow of water retards it; no ordinary drought affects it. It reproduces itself on the same ground without re-sowing, enriching a field, besides grazing the stock and yielding its hay.

It does not spread, but is easily gotten rid of by ploughing under; and above all, this grass, with our great Southern pea to follow it, will give to planters the cheapest, the earliest, the simplest, and the most paying plan to restore worn-out fields, and refertilize those not yet exhausted, which the ingenuity of man can devise. These two crops will restore the most worn and exhaused field, and richly pay us all the time they take to do it.

This grass, on *very rich ground*, will grow four feet high, and I am in the bounds of truth when I say it will produce over 100 bushels of seed from an acre. The seeds are larger than those of any known species, being nearly as large as grains of wheat. It is equally as nutritious as barley, and stock of every kind, together with every species of domestic fowl, are fond of it. For sheep, it has no equal; for making hay, no grass can compare with it. In fine, I say, without the least reservation, that the *Ceratochloa breviaristata* (which is the botanical name of

my grass) is without a rival in our climate and soil. The seeds of this grass I propose to sell the coming year, and have so advertised, at $5 per peck.

Statement of ANTHONY M. HIGGINS, *of Wilmington, New Castle county, Delaware.*

On farms not designed for grazing, clover is mostly raised for hay, averaging from one to two tons to the acre. It is an essential element in the improvement of our land. Timothy, however, makes a superior hay; it exhausts the land more, hence is restricted; is invaluable for horses and dairy cows, and yields more abundantly per acre than any other grass. Next to this is corn-fodder for grazing cattle and milch cows. The Delaware river is lined with a long strip of embanked meadow, constructed at a heavy expense, also at considerable annual cost to keep in repair; these meadows are valued, as to quality, up to $150 to $200 per acre.

A large amount of hay is annually cut—herdsgrass, Timothy, and, of late years, rye-grass. Price for clover hay $12 per ton; for Timothy, $18 to $20.

Statement of J. E. MCCLUNG, *of Bloomington, McLean county, Illinois.*

The best grass-seeds are found to be a mixture of clover and Timothy, in the proportion of one part of the former to three of the latter. A gallon of this mixture is sown upon an acre. It is important that the ground be thoroughly prepared for the seed by ploughing and harrowing. If the seed be sown with small grain in the spring, both should be brushed in together, which covers the seed to a proper depth, and leaves the ground in a good condition. I have succeeded in this manner in seeding my ground successfully by sowing my grass-seed with oats and flax; spring wheat answers equally well. Our prairie lands, without any stimulants, produce from one and a half to two tons to the acre. A little manure will increase the yield to three tons. The average price of hay is about $5 per ton in the meadow.

Statement of WILLIAM J. PHELPS, *of Elmwood, Peoria county, Illinois.*

Clover and Timothy are our principal grasses. They produce well when separately sown, but make the best meadow and pasture when about equally mixed. The yield of hay to the acre varies much with the season, and may be set down at from one and a half to three tons. Since the introduction of "grass-cutters," a man and a pair of horses will cut about ten acres in a day; and with a revolving rake one horse can easily rake more than twice that quantity.

Statement of EDWIN WINSHIP, *of Winship's Mills, Clinton county, Indiana.*

Few crops pay better for the labor of cultivation than clover. It is sown extensively every year as a fertilizer, and stands high in the estimation of our people. It is frequently cut for hay in July, and

again in the fall for seed. The yield is from two to three bushels of seed to the acre; which has been sold in market for some years past at $5 per bushel.

Clover is also extensively cultivated for hogs, which are taken off the last of July, and the crop suffered to grow five or six inches high for turning under to manure the land for wheat, when it seldom fails to bring a good crop. Clover, when cut for hay, yields about 1½ tons per acre; but 3 tons are frequently grown.

Timothy is the principal grass grown here for hay, and produces one crop which averages 1½ tons to the acre, and a fine after-growth for fall pasture, upon which I keep my spring colts and calves. Hay is worth $5 per ton in the stack.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Clover is cultivated largely for meadow, grazing, and as a fertilizer. It is almost the only manure used in general or field crops. The hay, when properly cured, is nutritious and good for cattle, horses, and sheep. Indeed, it is eaten by all of them with avidity. In strong ground the yield per acre is about 2 tons.

Timothy, in good soil, when the season is favorable, will yield 2 tons to the acre, though 1½ tons is a good average crop. Timothy, however, is rarely produced in this locality free from blue-grass and red clover; and the former, though it may diminish the quantity, will greatly improve the quality of the hay.

In the latter part of August and early in September, we plough down a heavy crop of red clover, and sow wheat; the next year, plant corn, and the third year sow oats, and with them clover-seed enough to set the ground. If we have more clover land than we wish to sow in wheat, we plough under as above, cross-plough the following spring, and plant corn; then sow rye or plant some other crop; and again sow oats or other grain, with the requisite quantity of clover-seed. The fields are in meadow or pasture till the third year, when a crop of clover is again turned under by the plough. By this method our land is in a state of continual improvement. Land that we bought in a state of exhaustion from many successive crops of Indian corn, has, by this renovating process, been brought to a good if not to a high state of cultivation and improvement.

Statement of DANIEL FULTON, *of Bowdoinham, Lincoln county, Maine.*

Hay is one of our most important crops. Average yield, 1½ tons to the acre. Cost of production, $7. Average price, $11. Since the potato rot, corn has been more extensively cultivated than formerly, and good crops have been raised for several years past.

Statement of SAMUEL JOHNSON, *of Jackson, Waldo county, Maine.*

I am situated on the height of land between the Kennebec and Penobscot rivers. The face of the country is very broken. Much of the

land is injured by a slate ledge running just under the surface, and often out-cropping. Where there is much depth of soil it is usually clayey and moist.

We are fifteen miles from Belfast, our nearest market, and the transportation thither costs $2 per ton. Labor in the summer season costs about $15 per month. Therefore, the character of our soil, the distance to market, and the high price of labor, at once call our attention to grazing. The ledgy lands are quite well adapted to mowing, and the more moist ones to the growth of fodder.

Where the land cannot be ploughed it is top-dressed, for which purpose any kind of well-pulverized manure, or ashes, is highly valuable. Plaster is sometimes used, but only in connexion with other fertilizers. Where land can be ploughed, I haul manure on the greed sward and turn it in, either in the fall or spring. I prefer the former if it is not a side-hill. I then lay the land down the first year, and usually sow oats with the grass-seed. The straw is useful for fodder, and the oats may be fed out or sold. In this way the land produces a valuable crop of fodder every year. I use the hoe as little as possible, and discard entirely the old routine of crops.

Statement of ARCHIBALD JONES, *of Frankfort, Waldo county, Maine.*

Among our native grasses, I would call attention to the "fowl-meadow," which grew wild at Madawaska before that place was settled by the Arcadian French. It flourishes best on "intervals," or meadows along rivers or streams, which in the spring are overflowed by backwaters or eddies, and receive a rich deposite of earth or mud. It also grows well where there is an overflow from the rise of water in natural or artificial ponds, provided the water runs off before the weather becomes too warm, and the land is well drained. If not, other water-grasses will prevail and force the fowl-meadow out. With an abundant spring overflow, with perfect drainage when the waters of the ponds or streams subside, fowl-meadow will give a crop of more value than any other grass. Water lying upon it all winter will kill it; but an occasional overflow by winter freshets is beneficial.

If this grass be cut three or four years before a portion of the seed scatters itself, it will disappear. A safe practice is, never to cut it for hay before the seed is ripe, which takes place before the stalks begin to turn. Where the seed naturally takes root in an open space, in two or three years it "tillers," or forms a bunch of numerous stalks, and is short-lived; but in cases where a meadow of this grass has been cut, two years in succession, earlier than the seed could scatter itself, by harrowing the surface and breaking the long fibrous roots, the plants will be multiplied from these roots. If the meadow be miry or soft, let it be harrowed when the frost is about half out.

In feeding out the hay, it is a good practice to save the seed-chaff, and scatter it over "swales," or moist upland mowing-lots, and over well-drained lowlands occasionally overflowed. In such situations it produces seed in abundance, and will readily take root among other grasses. Sown liberally over moist old mowing-fields, it will keep out much foul vegetation, which would otherwise be liable to work in.

It is another good practice for the farmer to cultivate a small patch of fowl-meadow, to ripen for seed to sow over such other mowing-lots as are mown too early to ripen the seed. It need not stand late, as, after reaping the tops for seed, the butts may be mown for hay.

As fodder for cows and sheep, fowl-meadow makes an excellent hay; but for horse-feed, with grain, it is too fine to keep the bowels of the animal properly distended for health. It here may be remarked that, however large the yield, of this grass never is coarse. As the butts are eaten with relish, there is no waste in feeding out. If the burden be heavy, it does not fall flat on the ground by its own weight, but "cripples" with the lower part on or near the ground, with the tops erect. If a summer freshet beats down this grass flat on the ground, new plants resembling "fiorin" start up from the joints, and increase the yield without rot or decay.

The butts, or stalks, of this grass, near the ground, being small, wiry, and full of joints, containing very little moisture, are easily dried and converted into hay; and, as the upper portions of the plant are small and limber, it is very little affected by rains when lying in the cock in the field. Hence it is very easily made into hay.

Statement of EDWARD STABLER, *of Sandy Spring, Montgomery county, Maryland.*

I will briefly give my mode of harvesting clover-seed with the mowing machine, and also the manner of preparing the seed for market. A large portion of my crop of seed-clover the past season was so fallen and lodged, that scarcely half the seed could be saved with the cradle; consequently, I was compelled to resort to the slow and expensive mowing with scythes, or use the machine. The trial with cradles resulted in breaking out the fingers, and leaving much of the best seed uncut; the scythe was both too slow and too wasteful.

The machine was set to cut rather higher than for mowing, and, by a side-delivery of my own construction, the seed was delivered at the side, and out of the track, in straight, loose bunches, in the best possible order for curing and taking up afterwards with almost the precision of clock-work, scarcely leaving a head standing to the acre, and literally leaving nothing for the rake to glean afterwards. It was completely cut and raked in about one-third the time the same hands could have properly raked it alone.

The seed is usually left from five to ten days in this state, in order to make it hull more readily; and a shower or two on it improves it both for the threshing and hulling operations. At a leisure time in winter, and in cold dry weather, I pass it through the common wheat-thresher to separate the heads from the straw. If in good order for threshing, the spike concaves are removed, and blank ones substituted in their places, which answers a better purpose—avoids cutting up the straw, and renders the raking much less tedious.

The next operation is the hulling. This is done either by running it two or three times through the same machine (spike concaves replaced) as fast as it can be forced in by a board fitting the opening, and having a short handle in the centre 15 or 18 inches long. It is

then fanned, when the unhulled seed, falling near the fan, and being much reduced in bulk, may all soon be hulled by passing four or five times through the machine.

An efficient machine that will hull and fan at the same operation is a great gain; for the hulling alone is a short job compared to fanning. I used a hulling machine this year for experiment, instead of the thresher, (without fan attachment,) but lost considerable seed; perhaps a bushel or more from cutting the seed. It is a tedious, and a very annoying operation from dust, to hull with the thresher and fan afterwards; but all the portable clover machines with fans that I have seen cost from $75 to $100—too expensive for general use, and often cutting the seed. I am satisfied, however, after some years' experience with the crop, that an efficient and durable machine with fan may be made for about half the money.

My crop of seed this season, on seventeen acres, yielded 43 bushels cleaned and ready for market; besides sowing a large cart-load of partially hulled chaff, not considered at the time worth hulling over, but proved afterwards, by hulling a similar lot, to contain from three pecks to a bushel of seed. Without close attention considerable loss may occur in throwing out the chaff, or sowing the seed too thick in the chaff. The crop, at the present market value, is worth near $300, and did not cost me, all expenses included, over $15 to $20; two-thirds to three-fourths of this is chargeable to the in-door work.

The average yield on so many acres is unusual; the more so, as over half the ground had produced two crops of grass, and on several acres of this the clover-seed was quite light. I attribute the increase to the liberal use of lime; for, without it, the yield would not have been a peck of seed to the acre; at least, the land never produced any, to my knowledge, previous to my liming; nor, in fact, half a crop of anything else, except briars, broom-sedge, and sassafras. And what is quite as much to the purpose, this single crop of seed amply repays me for all the lime, bones, and other manures used in renovating the land. To judge by the general appearance of the crop, probably two-thirds of the seed, or some three to four bushels to the acre, was grown on about eight of the seventeen acres; it being the first crop of seed, and having 150 bushels of lime to the acre, in two applications; and on this portion of the land, doubling the lime has certainly more than doubled the product in grass-seed.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachusetts.*

Grass is much relied upon in Western Massachusetts, and is thought by many to pay as well as any crop. On "intervals" it is raised with little expense, while uplands require frequent re-seeding or top-dressing with compost to keep them in a profitable condition. Where lands are much descending, the latter course, with the application of gypsum, is best; for such lands, when ploughed, are always more or less washed; and water, when it levies a contribution on the soil, always takes the best.

The probable average yield of hay, in ordinary seasons, is a ton and

a half to an acre. Many meadows produce much more, and but few less than a ton. The smallest yield that will pay expenses depends on the cost of land, the value the occupant sets upon his time, facilities to market, amount of taxes, and probably other causes, so various and fluctuating that no definite cost or profit can be given.

Statement of H. L. Brown, *of Fayette, Howard county, Missouri.*

Our land is unsurpassed for the growth of hay; no fertilizers being used. The best grasses for laying down in meadow are Timothy and clover. The best time for sowing Timothy is about the middle of August, by itself. The best time for sowing clover-seed is in the spring, after hard freezes. If sown upon the snow, as some recommend, there may come a warm spell sufficient to sprout the seed, when a hard freeze succeeding will kill it. I have known whole crops destroyed in this way. I have invariably had the best success in sowing with oats rather than with wheat. Hereafter, when I sow on wheat, I shall harrow afterwards, in order to give the roots sufficient loose dirt to withstand succeeding dry weather, which I have found often kills out more or less.

Statement of F. W. Lay, *of Green, Monroe county, New York.*

The vicinity of Rochester makes the raising of hay with us a very profitable crop. Clover is generally sown as a fertilizer, to be ploughed under, unless mixed with Timothy, which is now in great demand in our markets. I have never found clover hay injurious to horses; on the contrary, when properly cured, my horses have done the best upon it of any hay I raise.

I cure my clover hay, and indeed all other, as near as possible in this way: I cut my grass and immediately spread it, continuing mowing till about the middle of the afternoon, then commence raking with a horse-rake that first cut, and then roll it into large cocks. It remains in this state about two days to sweat, when it is drawn into the barn. The cocks, however, are sometimes opened previous to drawing, and at other times not, according as the hay is more or less damp. Unless the weather is very bad, I seldom have hay in the winter in any other than the best possible condition. I think many farmers are in an error in throwing open their barn-doors and letting the air come in too freely to the hay. I am convinced, by observation and experience, that the higher the barn, and the less circulation of air to the hay, the greener it may be put in, and the brighter and sweeter the hay will come out in the winter or spring.

Statement of John B. Young *and* James De Mott, *of Ovid, Seneca county, New York.*

Clover-seed, for some years, has been cultivated with us with good profit. The average yield to the acre will exceed two bushels; and, on some soils adapted to its growth, it will frequently yield five bushels per acre; and if of the early variety, it is usual to take off a second

crop of hay, averaging about 1½ tons per acre. About the first of June, if not mown, it is pastured until the middle of July. The profits of the two crops may be estimated as follows:

1½ tons of clover hay per acre, at $6		$9 00
2 bushels of clover-seed per acre, at $5 50		11 00
		20 00
Cost of cutting and securing hay	$2 00	
Cost of cutting and securing for seed	2 00	
Cost of threshing and cleaning two bushels seed	2 00	
		6 00
Profit per acre		14 00

In this estimate nothing is allowed for the interest on land; but the fall feed and the seed-straw for stock will be more than an equivalent in value.

Statement of JOHN FITCH, *of Troy, Rensselaer county, New York.*

Great attention is now paid to raising hay with us, which brings in market a remunerating price. The product of our meadows is so various that no reliable average as to the amount grown to the acre can be arrived at. The yield ranges from one to three tons per acre, depending mainly upon the season, the quality of the soil, and the amount and class of manures applied to the land.

Statement of WILLIAM M. MACY, *of Quercus Grove, Linn county, Oregon.*

Among the grasses here there is a variety—the bunch-grass, wild red-top, wild Timothy, buck-grass, rye-grass, Oregon blue-grass, white clover, trefoil, &c., all of which are very nutritious and durable. The grass grows all winter, spring, and in summer, until August, when the dews fail, and the ground becomes dry; then it dries up and is cut for hay, at which time it is as valuable as at any other period, from the fact that no decomposition takes place, as is common elsewhere, by dews and rain. As soon as the rains in the fall come, it begins to revive at the ground, and to throw out the fringes of the blades. Timothy hay is worth $20 per ton.

Statement of ISAAC R. EVANS, *of Harrisville, Butler county, Pennsylvania.*

Clover is beginning to receive increased attention. The quantity cut is about a ton to an acre. The best time for sowing is in March, on wheat; or it does very well when sown with oats. We sow about 12 pounds of seed to the acre; if for hay or pasture, we add four or five pounds of Timothy seed. Timothy is the only grass we adopt in laying down land for meadow. We sow about a peck of clean seed on an acre. Hay cannot be grown for less than $4 50 to $5 per ton.

Statement of H. N. McAllister, George Buchanan, James Alexander, J. K. Shoemaker, *and* William J. Waring, *being that portion of their report which relates to grass and hay, on the "Oakwood Farm," near Bellefonte, to the Centre County Agricultural Society, Pennsylvania, as the result of their personal experience and observation.*

Clover is the only crop ploughed under for manure. This is very much practised in some sections of the county, and its expediency very much depends upon locality, the value of pasture and hay on the farm, the facilities for making or purchasing barn-yard manure, &c., &c. Clover, by its long tap-roots, which cannot be removed by scythe or cattle, not only mellows but fertilizes the land. Timothy does neither, and we would not recommend its cultivation, except in localities where hay, as in the vicinity of this place, commands a good profit.

Statement of Peter Gross, *of Schnecksville, Lehigh county, Pennsylvania.*

Hay is the great crop of this county. Timothy is the most approved grass, making the best hay; but in renovating land it is more beneficial to sow with clover.

Statement of Joshua S. Keller, *of Orwigsburgh, Schuylkill county, Pennsylvania.*

We can raise here two tons of hay to the acre, which is a common yield under favorable circumstances. It sells in the coal region from $12 to $25 per ton, according to its scarcity or plenteousness—say, on an average, from $16 to $18 per ton.

Statement of V. M. Bee, *of Greenville, Greenville district, South Carolina.*

I have different kinds of grass on high lands, near my stables, for the convenience of soiling. I have had the lucerne more than twenty years, and cultivate in drills, manuring between the rows; but I fear that our native blue-grass is rotting it out. I have also native meadow grass, herdsgrass, and orchard grass, all doing very well, and some clover, although I dislike it on account of its salivating the stock.

Statement of Joseph Bowditch, *of Fairfield, Franklin county, Vermont.*

Herdsgrass (Timothy,) clover, and red-top, (herdsgrass of the Middle States,) are the only grasses cultivated here to any extent—the former being our principal dependence for hay. We sow eight quarts of herdsgrass and from six to ten pounds of clover per acre. For the first two years we get about an equal quantity of each kind. Clover being a biennial, after the second year the herdsgrass greatly predominates. There is, however, a small quantity of clover produced continually, from the shelling of the seed and from top-dressing. Very little white clover is sown. The farm which I occupy was cleared from the forest and brought under improvement sixty years ago. I have had exclusive management of it for about one-half of that time, and there never was, to my knowledge, any white clover sown upon it; and yet, in the month of

June, our pasture lands are thickly mottled with its white blossoms; and in dry seasons our hay largely partakes of it. Three thousand pounds of hay is an average yield per acre, although some lands produce four thousand pounds. A failure in our grain or root crop affects us but little; still, a slight falling off in our hay is materially felt.

As grass is the foundation of all good farming here, there is a general waking up to the importance of increasing its product. At least one-half of our manure is used as top-dressing for our mowing-fields. Some of them are never ploughed, being kept in a productive state by this method; yet the most of our dry land produces better by ploughing and newly seeding once in ten or fifteen years. Hay costs $3 50 per ton—namely, $1 75 to cut and secure, and $1 75 interest for land. It sells this year for $8 per ton.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

Large quantities of hay are cut on our natural meadows or wet prairies of good quality, which is well relished by the cattle of the county, which thrive on it through the winter. The cost of production is about $2 a ton, taking into account the interest on the land. It sells for about $3. It probably does not go so far towards feeding as Timothy hay, which sells here for $4 or $5 per ton.

BEANS AND PEAS.

Pulse of various kinds, from the facility with which they are produced in almost every country of the globe, and the highly nutritive properties which they usually possess, have been a favorite food for man and animals among all nations and in every age of the world. Thus we find that the Athenians employed sodden beans in their feasts dedicated to Apollo, and that the Romans presented them as an oblation in their solemn sacrifice called "Fabaria." Pliny informs us that they offered bean-meal cakes to certain gods and goddesses in these ancient rites and ceremonies; and Lempriere states that bacon was added to beans in the offerings to Cama, not so much to gratify the palate of that goddess as to represent the simplicity of their ancestors.

The common garden bean came originally from the East, and was cultivated in Egypt and Barbary in the earliest ages of which we have any records. It was brought into Spain and Portugal in the early part of the eighth century, whence some of the best varieties were introduced into other parts of Europe, and finally into the United States.

The first beans introduced from Europe into the British North American colonies were by Captain Gosnold, in 1602, who planted them on the Elizabeth islands, near the coast of Massachusetts, where they flourished well. They were also cultivated in Newfoundland as early as the year 1622; in New Netherland, in 1644; and in Virginia, prior to

1648. French, Indian, or kidney-beans were extensively cultivated by the Indians of New York and New England long before their settlement by the whites; and both beans and peas, (calavances,) of various hues, were cultivated by the natives of Virginia prior to the landing of Captain Smith. Among these was embraced the celebrated cow-pea, (phaseolus,) at present so extensively cultivated at the South for feeding stock, as well as for the purposes of making into fodder and for ploughing under, like clover, as a fallow crop.

The common pea is supposed to have been indigenous to the south of Europe, and was cultivated both by the Greeks and Romans. Its introduction into the British North American colonies probably dates back to the early periods of their settlements by Europeans, as it is enumerated, in several instances, among the cultivated products of this country by our early historians.

The amount of peas exported from Savannah in 1755 was 400 bushels; in 1770, 601 bushels; from Charleston, in 1754, 9,162 bushels; from North Carolina, in 1753, 10,000 bushels; annually from Virginia, before the Revolution, 5,000 bushels; annually from the United States, twenty years preceding 1817, 90,000 bushels. The amount of beans annually exported during the last named period, from 30,000 to 40,000 bushels.

According to the census returns of 1850, the amount of beans and peas cultivated in the United States was 9,219,901 bushels. The quantity of 1853, exclusive of those raised by market gardeners, may be estimated at 9,300,000 bushels; which, at $1 50, would be worth $13,950,000.

CONDENSED CORRESPONDENCE.

PRUSSIAN LEGATION, BALTIMORE,
December 6, 1853.

SIR: Conformably to my verbal promise, I herewith send you two bundles, containing two varieties of "frijoles," or Mexican beans, with a description of their culture, growth, and use.

I see, in the last papers from my country, that they are cultivated there with great success, and are looked upon as a future substitute for potatoes. Every soil and climate seems to be adapted for their cultivation.

Very respectfully, your obedient servant
FR. V. GEROLT.

Hon. CHARLES MASON,
Commissioner of Patents.

MEXICAN FRIJOLES.

There are two varieties of frijoles cultivated in Mexico; the one small, of a black color, growing on the coast, and in the hot climate, (tierra caliente,) and the other of a brown color and a larger size, in the high lands, under the temperate and cold climate of that republic. They grow in small bushes, and yield abundantly. The time of planting them is the months of April and May. The frijoles are the principal food of the Mexican population. When ripe and dry, they are generally soaked in soft water three to four hours, and then cooked in water with chopped onions and pork, or lard, without salt.

The culture of frijoles has been tried for the last few years in Prussia with great success, where they have been recommended to the farmers as a substitute for potatoes. They are a substantial, healthy, and most palatable food. Like the potatoes in Europe, they are always met with at the tables of the rich and poor.

For a delicate dish, the following direction is used: Soak the frijoles in soft water for three hours, and boil them with chopped onions and lard, without salt, in the evening, until they are nearly done. The next day, take sufficient lard, put chopped onions in it, and when very hot add the frijoles with their gravy to it, and let them boil quickly for a quarter of an hour, seasoning with pepper and salt. Care must be taken not to let the gravy boil all away, as when dry they are not so savory.

F. V. G.

THE OREGON PEA.

BY A. B. ROZELL, OF LA VERGNE, TENNESSEE.

The Oregon pea was brought a few years ago from Oregon Territory. Whether it was found wild there, or was obtained from the Indians, I am not prepared to say. I obtained from the State of Mississippi, a year ago last spring, about a teaspoonful of seed, from the product of which I raised last season thirty bushels of peas. Had it not been for the cut-worm, the ravages of which were very great, I would have raised one hundred bushels.

The seed of this plant is very small—less in size than that of the "lady, or sugar pea"—and of a pale green color, with a white "hilum," or eye. It grows on a bush from five to six feet high, with five or six large branches near the ground, and they, with the main stalk, put out other branches, until the stalks would make a bunch as large round as a tobacco hogshead, or near it. It grows more like cotton than anything else I know of, only it is much larger, with branches not so horizontal. After leaving the ground a little, all these branches, with those which put out at every joint, bear from four to ten pods in a bunch, with about fifteen peas in a pod, which, as an article of human food, are superior to anything of the kind I ever ate.

The stalks and leaves, which are very large and beautiful, make perhaps the finest hay in the world—stock preferring it to any other—

and yield a greater abundance. The hay and pea together, are a better and a far cheaper food than can be raised from anything else in the United States, for horses, mules, cattle, sheep, and hogs. I believe I can raise more and better feed for my stock, from one acre of land, than I can from five of anything else I know of. It will grow on land so poor that it would produce little or nothing else; and tolerably poor land is better for it, and will produce more than rich land. This may appear strange to some, but it is nevertheless true. Rich land will produce more stalks, but not so many peas; in this respect it is like cotton. As an improver of the soil, I consider it far superior to clover, or anything known in Tennessee, when fed off on the ground and then ploughed in.

If seed is the object one has in view in raising this plant, let it be sown in drills 4½ feet apart, one or two seeds in a place, one foot asunder along each drill. In the course of the summer, weed and cultivate with the plough or hoe, after the manner of raising bush-beans or Indian corn, For fodder or hay sow them broadcast, and lightly harrow them in, like wheat or other grain.

In short, taking this plant altogether, it is one of the finest and richest productions I ever saw; and I am satisfied in my own mind that it is the greatest acquisition to the farmers of the valley of the Mississippi, and the States adjacent, that has been introduced into this country—guano not excepted—for the last thirty years.

Statement of RICHARD E. HALT, *of Jacinto, Tishemingo county, Mississippi.*

The "Oregon pea" has been introduced into our section this season, and promises to do well as a hay, and is a better fertilizer than our common stock pea, for the reason that it produces double the amount of stalks and leaves on the same land, and appears to be well adapted to our climate and soil.

THE JAPAN PEA.

BY A. H. ERNST, OF CINCINNATI, HAMILTON COUNTY, OHIO.

The Japan pea, in which so much interest has been manifested in this country for a year or two past, from its hardihood to resist drought and frost, together with its enormous yield, appears to be highly worthy of the attention of agriculturists.

This plant is stated to be of Japan origin, having been brought to San Francisco about three years since, and thence into Illinois and Ohio. Its habit of growth is bushy, upright, woody, and stiff, branching near the ground, and attaining a height of three or four feet. The leaflets are large, resembling those of an ordinary bean, occurring in sets of three, with long quadrangular stems. The flowers, which are small and white, but rather inconspicuous, sometimes having purple centres, grow in thick clusters, nearly covering the principal branches of the plant, are succeeded by downy pods, from an inch to an inch and a half in length, each containing from one to three compressed oval

beans, when green, but unmarked, and of a buff color, resembling peas when dry. The stalks appear to be too woody for fodder in a dried state, though they may be used as such, together with the large thick leaves, when green. The excellency of the seed, at maturity, when properly cooked, for winter food, both for man and animals, has been fully tested, notwithstanding contradictory statements have been made.

This product will grow well on moderately fertile, as well as on rich soils, and may be planted in the latitude of Washington, one seed in a place, at the distance of three feet apart, from the last of April to the first of July. It seems to be well adapted to plant, as an after-crop, on land which has been cultivated with early potatoes or peas, or to supply the vacancies in a corn-field caused by birds or worms.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

Peas, although not much raised here, I have no doubt would prove as valuable as any other crop. I threshed, last August, 11 bushels of peas, the product of a third of an acre, after gathering certainly more than equal to two bushels of green peas, making altogether 13 bushels, or at the rate of 39 bushels to the acre. They were sown broadcast on clean land, where potatoes had been raised the previous year. Quantity of seed used, three gallons.

When it is considered that peas are equal to corn for fattening pork, that they are a surer crop in this latitude, and that they do not require half so much labor, I think it would be worth while for farmers to raise them more extensively. Sheep thrive on the haulms, of which they are very fond.

Statement of M. W. PHILIPS, *of Edwards's Depôt, Hinds county, Mississippi.*

When a boy, living in my native State, South Carolina, I heard of much stock being killed by the cow-pea, dying in a day or so after being turned into the field. This is not the complaint in latter times, for I have not known the loss of but one animal in this way for twenty years. In 1844, I was the individual who called attention to this subject, up to which time no one had, publicly at least, thought of it. Understand, all ye who thus charge your hands with carelessness and inattention, that we generally lose our stock after they have had the run of the field for weeks—sometimes not until they have been penned—and even dying the succeeding May and June. I will here explain my own case, somewhat as I did nine years ago, with a general hint at later experience.

Hogs were collected from their range as soon as corn had been gathered, in September or October, and turned in the pea-field. Often for weeks they improved, and with me, invariably, until a moist spell of weather, such as will rot the frosted peas and sprout the sound ones. In a day or two after, the hogs look gaunt, "tucked up in the flank," and are so listless that I have seen buzzards picking holes in their backs and sides without their being stirred up. I have had hogs die in the

field two weeks after being fed on corn in the pen, and I have had them die as late as January and February. I have had milch cows die two months after being first in the pea field; and have lost, first and last, $1,000 worth of stock. A few years ago, I had a field of seventy-five acres in corn, of which thirty were sown with peas; the balance with pumpkins, or without anything. One of those moist, warm spells came on, and I had three small boys, well protected by blankets, stay in the field during the time, and kept the hogs from the peas, feeding them well. I lost not one that year. Generally, old hogs are not killed. Sows will lose their pigs, and sheep will cast their lambs; but young stock are almost sure to die. Upon opening the animal, we always find the stomach and intestines diseased, from irritation in patches, and a total destruction of the mucus coat—often being as dark as claret.

I have lost this year five milch cows, after being in the pea-field from twenty to sixty days, for which I might have taken $200, being improved stock. I have also lost two hogs after being in pen twenty days, after having had the run of a fifty-five acre field until pretty well gleaned, and then a forty-five acre one, where there was corn enough to last, with pumpkins and peas, until penned—near three weeks longer; having been fed on peas in October and November, and a few days in December.

I could name, perhaps, fifty planters in this county who have lost stock from peas since 1844. I cannot say what it is. We know they die from the pea-fields; and some stock of the same years, which had no access, did not die. Decayed sweet potatoes will kill horses and mules. Unsound corn has killed horses and mules with staggers and cholic. Spurred rye will soon destroy poultry. Then, why not diseased peas kill? Is there to be no analogy, and no other help but carelessness and inattention?

THE CULTURE OF COLZA AND RAPE FOR OIL.

FURNISHED BY LIEUT. THORNTON A. JENKINS, U. S. N., SECRETARY OF THE LIGHT-HOUSE BOARD.

The following article on the culture of colza and rape is an abridged translation from Schlipf's "Manual of Husbandry for the People," third edition, enlarged and improved. This author, let it be remembered, was a lecturer of the Royal Wurtemberg School of Agriculture at Hohenheim, and the manual in question was written for a competition founded at the association of German agriculturists at Carlsruhe, in 1840, and obtained the prize.

The culture of colza and rape, or cole-seed,* has been attended with re-

*Botanists readily distinguish rape *(Brassica napus)* from colza *(B. oleracea campestris)* by noting the leaves of the young plants, those of rape being smooth, while those of colza are hispid or bristly. The latter yields about one-third more oil, and is the plant cultivated on the Continent of Europe for fodder and oil. Rape, or cole, is principally cultivated in England. This distinction for light house purposes should well be considered. T. A. J.

markable advantages in the districts where they have been introduced. They yield the earliest crops that give the farmer a money return; furnishing him with fodder at a season when it is ordinarily scarce, and their harvesting occurs at a time when he is not usually overpressed for other work.

Soil and exposure.—Rape or colza thrives principally upon a rich and deep soil, such as is suitable for barley and wheat; but more especially upon those which are mellow, marly, or calcareous. In a very light or a very stiff soil, they only succeed by heavy manuring. In wet lands, such as peat and moor grounds, they do not thrive at all. They answer in all the districts of Southern Germany except on the bleak mountain-sides. Unseasonable weather in spring, especially extreme changes from warm to cold, in April and May, is very prejudicial. Very cold and raw north and east winds are likewise very injurious when the ground is not covered with snow. Standing water is very hurtful to the soil.

Rotation of crops.—Colza agrees well with every other growth, and is especially good to precede winter grain, when it has thriven well. The best fore-crops are feed-rye, feed-vetches, and clover (or those crops used for soiling) on the three-field system.* It is sown usually in the summer field, so that it ripens for fallowing,† and the winter grain following it has then the advantage of a half fallowing. In a regular rotation, ordinarily, feed-rye or feed-vetches precede it.

Manuring.—Colza requires a very heavily manured soil, and more especially loves the liquid manure from the barn-yard or dung-hill. If the manure be applied immediately, the seed often ripens unequally; therefore it is better to manure the preceding crop. On the stiffer soils sheep dung, especially, is advantageous.

Preparing the soil.—Colza needs the utmost working and pulverization of soil, which it obtains very well from naked fallowing. After feed-rye, the ground can readily be prepared; and so, too, after clover, when only the first cutting has been taken. Thorough ploughing, harrowing, and rolling, are never lost, and are especially necessary when the seed is sown with a machine.

---

*This term has to be translated literally, for we have here no vernacular word for expressing a system, which, coming down from the time of Charlemagne, is yet prevalent in Germany. In this the farm is divided into three fields; the word field not being taken here to mean necessarily a single self-contained enclosure. The fields or divisions are classed into, 1st, winter crops; 2d, summer crops; and 3d, fallows. In this system there is no provision made for grass and hay, and therefore, as the straw from the two crops will hardly hold out unless manure is imported on the farm, the land will in time be brought to a very poor condition.

† The world *fallow* is used in several senses in agriculture. For instance, it is an adjective, a substantive, and a verb. Thus, we speak of land "lying fallow," which means sometimes unseeded, sometimes unploughed, and at other times (metonymically) neglected, or, in our phrase, "old fields." Again, a fallow is sometimes applied to mean only a "breaking up." Sometimes, and most frequently with us, it signifies a "fresh breaking up," to be ploughed over again. In some districts it seems to be understood as applicable to ploughing for a particular crop, (grain.) This employed in the text in what seems to be its primary sense, that of "breaking up" for a crop to be afterwards put in.

What is called in the next sentence "a regular rotation," is a version of the German word *Frucht-wechselwirthschaft*, for which we have in English no single corresponding word. Its principle is, that two crops of the same kind are not to succeed each other. Thus, for instance, a grain and straw crop, like wheat, is not to be followed by a crop of oats, but intervening will be clover or potatoes.

Different methods of cultivation.—Colza is raised in three different modes: 1. Drilled or sown with a seeding machine, which has very many advantages over the others; for the drilled seed, better protected against wet and cold, leaves room for the possible workings to keep the ground freer and cleaner of weeds; so, too, the proportionate yield is higher, for less seed is taken in machine sowing. They reckon for this six to seven pounds per acre in Baden; four to five pounds in Hesse; five to six pounds in Wurtemberg. With the machine the colza is seeded in the first half of August—often, in many places already, at the end of July; worked in the middle of September with the horse-hoe; and in October hilled once or twice with a hill-plough. If seeded too thick, it must be thinned late in the year. The machine, with one man, can seed in a day from six to seven acres. If the ground during winter has been oversoaked, good service is done by another hilling in the spring when it is dried.

2. Broadcast seeding is done at the end of July or beginning of August. The ground must be lightly harrowed and the seed covered in. Some pounds more of seed is required for this than for machine seeding. Care must be taken to make the casts uniform, so that the plants may stand at the proper distances. Since the introduction of seeding machines, broadcast sowing has grown very much out of vogue, as it is often liable to injury in unfavorable winters.

For transplanting or planting, the seed must have been put in during the latter half of July. The field on which the rape is to be planted can be sufficiently prepared if it has borne, just before, a straw crop. One acre of rape beds will cover two to three acres of plants.

3. On large establishments the planting is done in the beginning of October, with the plough, the plants having been drawn beforehand. A furrow is made, on the steep side of which the plants are set, from four to six inches apart. This setting is done by eight or ten grown boys or girls, who are stationed along the whole length of the furrow, each one having a certain distance to set in, and being supplied with the necessary number of plants. The plants thus set are covered by the return furrow, along which there is then a fresh setting. If any of the plants fail of being properly covered, they must be attended to. The cost of planting is from $1 37½ to $2 50 per acre. On small plantations it is done with the spade and dibble, which is more costly, but often pays well.

Harvesting.—The harvest occurs generally at the end of June or the first of July, and is commenced when the pods are brown, and half of the seeds are found to be of a dark-brown color. The duration of these harvests, most years, is very short, and therefore it is necessary to watch every day the grade of ripening. The cutting is regularly done with a sickle, and this in the morning, so that but few grains may fall out. Every two handfuls are laid on the ground, with the cut ends crossing and the pods spread out. These swaths are left in the field for some days, and after they are sufficiently dried, are hauled in upon sheets spread in the wagon. In order that the seeds may not be wasted in loading, a long sheet is spread on the ground by the side of the wagon. The harvest women take up the swaths carefully and lift them over this sheet, upon the wooden pitch-forks of the loaders. In

some parts of France colza is shocked in the field, the single swaths being laid in a circle, with the seed-ends toward the centre, so that the diameter is double the length of the stalk. In building up the shocks, which are made five or six feet high, this diameter is continually diminishing, so that the stalks require an inclination outward and downward. The shocks are left in this state until the seeds have fully dried, as is the case in eight or ten days. For hauling in, a sheet is laid by the side of the shock, upon which it is tumbled with pitch-forks. In some districts, however, the seed is threshed out in the field. When hauled in, it is left still some days on the barn-floor, in order that the seeds may entirely ripen. After threshing, the seed, partly mixed with husks and dust, is left upon the floor, spread out thin, (two to four inches high,) and turned over at first twice a day, afterwards once a day, until it is perfectly dried, which will be in eight or ten days.

Yield.—This is very variable, being subject to divers contingencies. It is reckoned per morgen.*

In Baden.....	3—8—10	and	15—25	centner of straw.
Hesse.....	2—6		10—20	" "
Wurtemberg.....	2—7 scheffel		12—22	" "

Drilled, sown, or planted seed usually gives a higher yield than broadcast. The yield of pods may be taken per morgen at from 5 to 8 centner.

The price of colza, or rape-seed, is subject to rises and falls, and fluctuates between 12 and 30 florins per scheffel.†

A ten years' average, from 1832 to 1841, gives as a mean price 23 florins, $19\frac{3}{8}$ kreutzer. Light rape is bought usually at two-thirds, and often for one-half.

Weights and product in our measures :

		Weight.	Oil yielded.	Oil-cake.
Baden.....	1 bushel	$54\frac{3}{8}$—57 lbs.	$18\frac{1}{8}$—$20\frac{3}{4}$ lbs.	$31\frac{3}{8}$—$34\frac{3}{16}$ lbs.
Hesse.....	"	$54\frac{1}{8}$ lbs.	$19\frac{3}{4}$—$21\frac{1}{4}$ lbs.	$33\frac{3}{8}$—$36\frac{2}{5}$ lbs.
Wurtemberg	"	$49\frac{1}{5}$—$50\frac{7}{8}$ lbs.	$16\frac{2}{5}$—$19\frac{11}{16}$ lbs.	$29\frac{1}{2}$—$32\frac{4}{5}$ lbs.

Summer rape.—This crop is much more uncertain than the winter, and ordinarily it is only tried to any extent when the latter has failed. It suits a light soil better, and succeeds upon those black and muddy, or those of dried ponds. It requires, like the other, heavy manuring; well working and good weather are both necessary. The seed is put in by the end of April, and there is allowed one-fifth of a bushel per acre. The yield is from 33 to 50 per cent. less than from the winter rape.

Note.—This plant, which is of the cabbage tribe, is extensively cultivated in various parts of Europe, for the sake of its seed, from which oil is extracted by grinding and pressure, and is used for the purposes

---

*The quantities in this paragraph become, when reduced to our measures, as follows :

	Per acre.	*Per acre.*	*Average per acre.*
Baden.....14—36—47	bushels.	0.92—1.50 tons.	$32\frac{1}{2}$ bushels=1.21 tons.
Hesse Darmstadt	12—35 "	0.88—1.76 "	$23\frac{1}{2}$ " 1.32 "
Wurtemberg.....	13—46 "	0.88—1.60 "	$29\frac{1}{2}$ " 1.24 "

† These rates reduced to our measures are represented by $93\frac{3}{4}$ cents, and $2 31 per bushel. The mean price is $1 80 per bushel.

of illumination. It is extensively cultivated in England for the succulent food which its thick, fleshy stems and leaves supply to sheep and cows when other fodder is scarce. Large quantities of this seed are annually imported into the United States, at an expense of $3 or $4 per bushel, for feeding cage-birds.

The following sketch of the mode of cultivating this plant is condensed from the work of Rev. W. L. Rham, of England, one of the best practical writers of the day: Rape may be sown in spring as well as in autumn, and is sufficiently hardy to resist the winter's frost. Where the cultivation is on a small scale, the seed-bed is usually prepared by digging or trenching with the spade in a good loamy soil, neither too sandy nor too wet. A large proportion of rotten dung is spread evenly over it, and dug in six inches deep, and the surface is raked fine. The seed is sown broadcast or in drills; the latter is the best method. It is then slightly covered with the rake; and if the ground will allow it, without risk of its being bound too hard in case of dry weather, it is well rolled or trodden with the feet. The seed must not be sown too thick; and the plants as soon as they have six leaves must be thinned to a distance of four or five inches in the rows, which will make them stronger and better furnished with roots. One acre of seed-bed will furnish plants for ten acres or more in the field. The seed is sown in July or August, that the plants may not run to seed the same year, which they are apt to do if sown early; and they are transplanted in September or October, on land which has already borne a profitable crop. Winter barley and rye, which are reaped early in July, are very proper crops to be succeeded by rape. The stubble should be ploughed two or three times to pulverize and clean it. A good coat of rotten dung should be put on, and the land ploughed in ridges, as for turnips. The plants should be put in on the ridges 10 inches apart. In transferring them from the seed-bed to the field, it requires great care, in taking them up, not to break the fibres of the roots; they should be raised with a fork, and placed gently, with the fine earth adhering to them, in flat baskets, and in a slanting position, so that the tops may be upward. In planting, the holes should be made with a large, thick dibble, that the plants may be introduced without doubling up the principal roots or breaking the fibres. The earth should be pressed to the root by a short dibble, inserted to the right or left of the hole made by the first dibble; or, which is better in stiff soils, a hole should be made, with a narrow hoe, of sufficient depth to allow the plant to be placed in it, and another hoe should follow to draw the earth to the plant. Thus two men with hoes and one boy will plant a row more rapidly than could be done in any other way. The man who fills up the holes places his foot by the side of each plant as he goes on, to press the earth to the roots.

An expeditious mode of planting rape is used in Flanders. A spade 10 inches wide is pushed vertically into the ground, and, by drawing the handle towards his body, the laborer makes a wedge-like opening; a boy inserts a plant in each side of this opening, and when the man removes the spade the earth falls back against the plants; the boy puts his foot between the two plants, and they are then fixed in their places. In this operation, the man moves backward; and the boy who puts

in the plants, forward. No further attention is requisite till spring; the weeds are then carefully extirpated by hand and hoe, and where the distance of the plants admits of it, a light plough stirs the ground between the rows, throwing the earth towards the stems, so as to leave each plant in a little basin to catch the water, and conduct it to the roots. When the plants are invigorated with rich liquid manure, such as night-soil mixed with water, or the drainings from dung-hills, they become extremely luxuriant, and every trouble and expense bestowed upon them is amply repaid. The difference between a crop partially neglected and another carefully cultivated, often exceeds 50 per cent.

When the rape is transplanted before winter, it is much more productive than when sown in the spring. In the latter case it produces seed the same year, and is sometimes called "spring" or "summer rape." It is sown in drills, and thinned out by the hoe; and in favorable seasons a tolerable crop is obtained. It is generally sown on land which could not be brought into a proper tilth after harvest, and which would require the frost of winter to mellow it. Great crops of rape have been produced by merely paring and burning the surface, and ploughing in the ashes.

The rape ripens its seeds very unequally. The lower pods are ready to burst before those at the top are full. If the season is wet at harvest, much of the seed is lost; and, without great attention, some loss is sustained in the most favorable seasons. It should be cut when the dew is on it, and moved as little as possible. If the weather permits, it is threshed out on a cloth in the field; and as many threshers are employed as can be conveniently collected, that no time may be lost when the weather is fair. The seed is spread out on the floor of a granary, that it may not heat, and is turned over frequently. It is then sold to the crushers, who express the oil. The pods and small branches which are broken off in threshing, are much relished by cattle.

Ellis, in his "Modern Husbandman," published in 1741, recommends, as soon as the young rape plants appear above the ground, the sowing to each acre one of the following named substances, in quantities as indicated respectively: 12 bushels of peat ashes, 40 bushels of coal ashes, 60 bushels of wood ashes, or 20 bushels of soot; as any of these will not only tend very much to secure the crop against the slug, the worm, the caterpillar, or grub, but will keep off the power of frosts and the chills from wet, in hastening the growth of the infant plants in winter and spring. D. J. B.

SUGAR.

Sugar, so extensively used in every country of the habitable globe, and forming, as it does, one of our chief staples, supplies its commercial demand mainly from the juice of the cane, which contains it in greater quantity and purity than any other plant, and offers greater facilities for its extraction. Although sugar, identical in its character, exists in

the maple, the coco-nut, and the beet-root, and is economically obtained to a considerable extent, yet it is not often sufficiently pure to admit of ready separation from the foreign matter combined with it, at least by the means the producers usually have at hand.

The early history of cane-sugar, like that of many other necessaries of life, is involved in great obscurity. It appears to have been imperfectly known to the Greeks and Romans, as Theophrastus, who lived 320 years before Christ, describes it as a sort of "honey extracted from canes of reeds;" and Strabo, who states on the authority of Nearchus, the commander of the fleet in the expedition of Alexander the Great, says that "reeds in India yield honey without bees."

Although India and Cochin-China are the countries usually cited as the native homes of the sugar-cane, where this plant grows wild, nevertheless, Roxburgh, in his "Flora Indica," declares that its indigenous habitat in the East Indies is unknown. It occurs in a wild state on many of the South Sea islands, especially in Tahiti, but in no part of the American continent, notwithstanding contrary statements have been made. It is true, a species of cane is found in Central America, apparently indigenous, which is rich in saccharine juice, and is very readily crushed by rollers; but it is not known with certainty when it was discovered, nor whether or not it is the result of self-sown seeds of some variety of the Eastern cane. The cultivated sugar-cane, let it be understood, very rarely produces seeds, although it sometimes occurs even in our Southern States.

The culture and manufacture of sugar, it is stated, were introduced into Europe from the East, by the Saracens, soon after their conquest, in the ninth century; and it is known that the Arabs caused the extension of the cultivation of this plant to Rhodes, Crete, and Sicily—nay, even to Calabria and Spain. It is also stated by the Venetian and Amalfian historians, that their countrymen imported sugar from Sicily in the twelfth century, at a cheaper rate than they could obtain it from Egypt, where it was then extensively made. The first sugar plantations established in Spain were at Valencia, but they were soon after extended to Granada and Murcia. Prince Henry, the navigator, carried sugar-cane from Sicily to Madeira. Towards the end of the fifteenth and the commencement of the sixteenth centuries, it was conveyed to the Canary islands, where plantations were formed, especially on Gomera and Grand Canary. From Gomera it was introduced into the West Indies by Columbus, in his second voyage to America, in 1493, and soon after became diffused over Mexico, Guiana, and Brazil. It was cultivated to a considerable extent in St. Domingo, in 1506, where it succeeded better than in any of the other islands. In 1518, there were twenty-eight plantations in that colony, established by the Spaniards, where an abundance of sugar was made, which, for a long period, formed the principal part of the European supplies. Barbadoes, the oldest English settlement in the West Indies, began to export sugar in 1646; and in the year 1676, the trade of that island required four hundred vessels, averaging 150 tons burden.

The common sugar-cane is very sensitive to cold, and is therefore restricted in its cultivation to regions either situated within or bordering on the tropics, where there is little or no frost. In intertropical Amer-

ica, it occurs at the height of 4,000 feet above the sea; and in particular places, under favorable circumstances, even over 6,000, especially on the elevated plateaux of Mexico. In Nepal, in Asia, it extends up the Himalayas 4,500 feet. It thrives best in a mean annual temperature of 77° to 84° Fahrenheit; but it succeeds even at 66° to 68°.

In the existing distribution of sugar-cane, as a field crop, in the United States, it is found as far north as 32° east of the Rocky mountains, although, from its flexibility or disposition to acclimatize itself, it is highly probable that it is gradually becoming more hardy, and eventually will endure an exposure and yield a profitable return much further north, along the borders of the Mississippi and some of its tributaries, than it has hitherto been produced. In most parts of Louisiana the cane yields three crops from one planting. The first season it is denominated "plant-cane," and each of the subsequent growths "rattoons." But sometimes, as on the prairies of Attakapas and Opelousas, and the higher northern range of its culture, it requires to be replanted every year. Within the tropics, as on the island of Cuba and elsewhere, the rattoons frequently continue to yield abundantly for twelve, fifteen, and even twenty-four years, from the same roots.

As before remarked, sugar, identical in its character, is obtained from other plants besides cane. But there are only two of sufficient importance to deserve mention here, namely: the beet-root and the maple. When Napoleon formed the gigantic, but neither practicable nor liberal, idea of intercepting all intercourse between the Continent of Europe and Great Britain, in order to destroy the commerce of that country, it became necessary to look for a substitute for this important product, only to be obtained on the Continent by the aid of an open trade. The discovery that sugar might be manufactured from the juice of the beet-root was therefore, of course, very welcome to him. He made every effort to stimulate the agriculturists to grow this plant. He encouraged the chemist to contrive the best method of preparing the sugar, and of applying to it the refining process. In 1810, there existed in his dominions two hundred beet-root manufactories, which annually delivered 2,000,000 pounds of sugar; but still, this was only one fifty-eighth part of the consumption in France. After the colonial sugar could again be introduced, the sale of beet-root sugar decreased; but its production subsequently increased to an extraordinary degree, through improvements in manufactures and its combination with agricultural systems, and annually yielded about 24,000,000 pounds. It again decreased in France after a tax had been laid upon sugar of domestic growth. The amount cultivated in that country between the 1st of September, 1852, and the 31st of August, 1853, was 75,275,235 kilogrammes, (165,680,790 pounds.) Its culture has been extended over Germany and Belgium, as well as some other European States.

The extraction of sugar from the maple is a valuable resource near every new settlement where that tree abounds; but it is obvious that this mode of obtaining sugar is only destined for certain stages of our national economy, and eventually gives way for the sugar of commerce produced by cane. On the authority of Beverley, in his "History of Virginia," it was made by the Indians prior to the arrival of Europeans; other writers say it was unknown to them, at least to certain

tribes. Some fifty or sixty years ago, Count Wingersky planted a large number of sugar-maples on his estate in Moravia, with the object of making sugar; from which he drew off the sap when the trees had arrived at the age of twenty-five years. He succeeded in obtaining a very fair article; but, in consequence of depriving the trees of their sap every year, they became sickly, and soon afterwards died.

The amount of maple-sugar made in 1811 in Ohio was 3,033,806 pounds; in Kentucky, 2,471,647 pounds; in East Tennessee, 162,240 pounds; in Vermont, 1,200,000 pounds; in the United States, in 1840, 35,105,705 pounds; in 1850, 34,253,436 pounds.

The amount of cane-sugar and molasses of domestic growth and manufacture, and their values, exported from the United States within the last thirty-three years, are denoted in the following table:

Years.	Brown sugar.	Value.	Refin'd sugar.	Value.	Molasses.
	Pounds.	Dollars.	Pounds.	Dollars.	Dollars.
1820–21	24,592	1,975	156,527	24,051	.....
1821–22	8,593	805	177,065	26,320	.....
1822–23	3,846	353	55,187	6,654	.....
1823–24	5,960	434	57,908	7,195	.....
1824–25	27,782	2,632	50,017	6,963	.....
1825–26	57,025	4,964	168,991	27,043	621
1826–27	18,703	1,489	236,744	34,012	1,511
1827–28	54,035	4,095	269,291	38,207	601
1828–29	53,778	3,289	479,218	50,739	1,992
1829–30	37,646	2,975	1,586,220	193,084	3,968
1830–31	180,132	10,105	2,057,487	215,794	948
1831–32	154,160	11,232	701,862	74,673	2,493
1832–33	100,340	7,635	416,736	40,327	2,279
1833–34	108,087	6,461	2,355,754	219,153	5,934
1834–35	102,431	8,526	768,075	62,293	1,963
1835–36	128,119	12,342	1,442,989	165,648	851
1836–37	306,602	22,668	1,844,167	215,728	7,171
1837–38	408,802	30,487	2,610,649	249,671	6,620
1838–39	387,203	28,722	4,782,723	521,117	3,438
1839–40	769,908	45,940	10,741,648	1,214,658	9,775
1840–41	312,864	23,837	13,435,084	1,348,974	7,999
1841–42	166,533	8,890	3,430,346	291,499	19,040
1842–43	68,563	3,435	598,884	47,345	1,317
1843–44	187,118	12,363	1,671,107	128,594	3,922
1844–45	195,985	11,107	1,997,992	164,662	20,771
1845–46	109,295	7,235	4,128,512	392,312	1,581
1846–47	388,057	25,483	1,539,415	124,824	26,959
1847–48	135,006	8,891	3,378,773	253,900	5,563
1848–49	399,209	24,906	1,956,895	129,001	7,442
1849–50	458,839	23,937	2,786,022	285,056	14,137
1850–51	561,828	29,176	2,689,541	219,588	16,830
1851–52	401,620	24,057	2,096,770	149,921	13,163
1852–53	672,274	33,854	5,155,057	375,780	17,582

According to the census returns of 1840, the amount of cane-sugar made in the Union was 119,995,104 pounds; of 1850, 247,577,000 pounds; showing an increase of 127,581,896 pounds, besides 12,700,896 gallons of molasses. It was estimated that in 1815 the cane-sugar made

on the banks of the Mississippi alone amounted to 10,000,000 pounds; in 1850, it had reached the enormous quantity of 226,000,000 pounds, besides upwards of 12,000,000 gallons of molasses. The amount of cane and maple-sugar made in the United States in 1853–54 may be estimated at 545,000,000 pounds, which, at 6 cents, would be worth $32,700,000; besides 14,000,000 gallons of molasses and syrup, which, at 30 cents, would be worth $4,200,000.

CONDENSED CORRESPONDENCE.

Statement of the sugar crop made in Louisiana in 1853–54, *from P. A. Champomier, of New Orleans.*

Parishes.	Number of sugar-houses.	Number by steam-power.	Number by horse-power.	Number of hhds. sugar.
Rapides	43	37	6	18,994
Avoyelles	28	17	11	8,491
West Feliciana	19	18	1	8,551
Pointe Coupée	58	56	2	15,417
East Feliciana	13	13	----	3,549
West Baton Rouge	57	50	7	21,024
East Baton Rouge	53	49	4	12,701
Iberville	133	115	18	39,786
Ascension	56	50	6	30,760
St. James	85	67	18	33,736
St. John the Baptist	67	51	16	17,601
St. Charles	35	35	----	18,386
Jefferson	29	29	----	15,810
Orleans and St. Bernard	25	25	----	9,243
Plaquemines	45	45	----	25,042
Assumption—Bayou Lafourche	154	69	85	32,612
Lafourche Interior Bayou	77	55	22	24,081
Terrebonne Bayou	88	55	33	24,393
St. Mary, Attakapas	182	67	115	39,105
St. Martin...do	99	15	76	14,347
Vermilion, Lafayette	17	16	----	1,129
Lafayette	17	2	15	3,162
St. Landry, Opelousas	65	35	30	12,711
Divers small parcels made in hogsheads and barrels in different sugar-houses not reckoned.				
Cistern bottoms of 366,667 hogsheads brown sugar, at an estimate, say of 5 per cent.	----	----	----	18,333
Total	1,437	956	481	*449,324

*Estimated at 495,156,000 pounds.

Brown sugar made by the old process	366,667 hhds.
Refined, clarified, &c., including cistern	82,657 "
	449,324

Statement of the sugar crop of Texas in 1853, *from P. A. Champomier, of New Orleans.*

	Pounds.
Brazoria	5,439,000
Matagorda	1,598,000
Wharton	531,000
Fort Bend	720,000
Total amount	8,288,000

TOBACCO.

Tobacco, from the extent to which it is cultivated, its importance to commerce, and the modes of employing it to gratify the senses, exhibits one of the most remarkable features in the history of man. From the solace only of the wild Indians of America, it has become one of the luxuries of the rich, and gives pleasure to the poor, throughout the habitable globe, from the burning desert to the frozen zone. In short, its use for snuff, for chewing, or for smoking, is almost universal, and for no other reason than a sort of convulsion (sneezing) produced by the first, and a degree of intoxication by the last two modes of usage. This plant is indigenous to tropical America, and was cultivated by the aborigines, in various parts of the continent, previous to its discovery by Europeans. Columbus found it on the island of Cuba in 1492, where he was invited by a chief to partake of a cigar. In 1486, Romanus Pane published the first account of it as growing in St. Domingo, calling it *choba*, *chobala*, and *givia*. Sir Richard Grenville found it in Virginia in 1585, when the English, for the first time, saw it smoked by the natives in pipes made of clay. It is believed to have been introduced into England by Raleigh's colonists on their return from Virginia, in 1586. Soon after the settlement of Jamestown, from the increased demand in Europe, and the peculiar adaptation of the soil to its culture, considerable quantities were raised, and numerous individuals, interested in the colony, contributed to induce that taste for it which had already been diffused among all classes.

In 1611, tobacco was first cultivated in Virginia by the use of the spade, previous to which it had only been raised after the rude manner of the Indians. In 1616, it was cultivated in that colony to so alarming an extent, that even the streets of Jamestown were planted with it, and various regulations were framed to restrain its production; but every admonition to the settlers was disregarded. James I. attempted, by repeated proclamations and publications, to restrain its use; but his efforts had very little effect, and the colonists continued to experience a more rapidly-increasing and better demand for this staple than for any other in the province.

In 1617, the prices varied from 37½ to 75 cents per pound. In 1621, each person was required to cultivate one thousand plants, of eight

leaves, weighing in the aggregate 100 pounds. In 1622, there were made in the colony 60,000 pounds. In 1639, it was enacted by the Grand Assembly, "that all the tobacco planted this present year, and the two succeeding years, in the colony of Virginia, be absolutely destroyed and burned, excepting and reserving so much, in equal proportion to each planter, as shall make, in the whole, just the quantity of 120,000 pounds, stripped, smoothed, &c. In consideration whereof, the creditors of the planters were compelled to accept and receive 40 pounds of tobacco, so stripped and smoothed, in full satisfaction of every 100 pounds now due them." This plant, when its half inebriating and soothing influence recommended it to popular use, encountered much violent opposition by several governments, which also attempted to restrain its consumption by penal edicts. The Sultan Amurath IV. forbade its importation into Turkey, and condemned to death those found guilty of smoking.

The Grand Duke of Moscow prohibited its entrance into his dominions under pain of the "knout" for the first offence, and death for the next; and in other parts of Russia the practice of smoking was denounced, and all smokers condemned to have their noses cut off. The Shah of Persia, and other Eastern sovereigns, were equally severe in their enactments. Pope Urban VIII. anathematized all those who smoked in churches. In 1654, the counsel of one of the Swiss cantons cited all smokers before them; every inn-keeper was ordered to inform against those who were found smoking in their houses; and in the laws of Berne there is conclusive evidence of the serious light in which this, at that time, presumed crime was held. About this period, not only legislators in various countries, but philosophers (at least book-makers) entered into a crusade against tobacco. Upwards of a hundred volumes were written to condemn its use, the names of which have been preserved and their titles catalogued; and among them, not the least singular was the "Counterblaste" of the pedantic James, to which allusion was just made. But notwithstanding all opposition, smoking has spread not only through all polished, but savage countries; and instead of being "scorned and contemned by strangers," and wondered at by all forreine civill nations," the practice is countenanced by the rich and the poor, the learned and the gay.

Tobacco was cultivated in New Netherland as early as 1646, when it sold for 40 cents per pound. It was introduced into Louisiana by the "Company of the West," in 1718.

Some time previous to the war of independence, the culture of tobacco had spread into Maryland, Carolina, Georgia, and Louisiana, from which nearly all Europe was supplied; but at present most of the sovereigns of the Old World derive a considerable part of their revenue from the cultivation of this plant.

The amount of tobacco exported from Virginia in 1622, was 60,000 pounds; in 1639, 120,000 pounds; in 1758, 70,000 hogsheads; annually for ten years preceding the Revolution, 55,000 hogsheads; from City Point in 1791, 29,994 hogsheads; in 1795, only 9,475 hogsheads; from North Carolina in 1753, 100 hogsheads; from Georgia in 1722, 176,732 pounds; from South Carolina in 1783, 2,680 hogsheads; in 1795, 4,294 hogsheads; from Philadelphia in 1796, 3,437 hogsheads.

The annual exports from the British North American colonies for ten years ending in 1709, were 28,868,666 pounds; from 1744 to 1776, the average annual exportation was 40,000,000 pounds; from 1768 to 1770, both inclusive, 67,780 hogsheads of about 100 pounds each, or 67,780,000 pounds;* in 1772, 97,799,263 pounds; in 1780, 17,424,267 pounds; in 1782, 9,828,244 pounds.

The following table exhibits the quantity and valuation of tobacco, and its products of domestic growth and manufacture from the adoption of the constitution up to 1853:

Years.	Tobacco.	Value of tobacco.	Snuff.	Tobacco manufactured.	Value of snuff and tobacco manufact'd.
	Hogsheads.	Dollars.	Pounds.	Pounds.	Dollars.
1787	99,041	.....	.....	.....	.....
1788	88,595	.....	.....	.....	.....
1789	88,675	.....	.....	.....	.....
1790	118,460	.....	.....	.....	.....
1791	101,272	.....	.....	81,122	.....
1792	112,428	.....	.....	117,874	.....
1793	59,947	.....	.....	137,784	.....
1794	72,958	.....	.....	19,370	.....
1795	61,050	.....	.....	20,263	.....
1796	69,018	.....	.....	29,181	.....
1797	58,167	.....	.....	12,805	.....
1798	68,567	.....	.....	142,269	.....
1799	96,070	.....	.....	406,076	.....
1800	78,686	.....	.....	457,713	.....
1801	103,758	.....	.....	472,282	.....
1802	77,721	6,220,000	.....	233,591	.....
1803	86,291	6,230,000	.....	152,415	.....
1804	83,341	6,000,000	.....	208,139	.....
1805	71,251	6,341,000	.....	428,460	.....
1806	83,186	6,572,000	.....	381,733	.....
1807	62,236	5,476,000	.....	274,952	.....
1808	9,576	838,000	.....	36,332	.....
1809	53,921	3,774,000	.....	350,835	.....
1810	84,134	5,048,000	.....	529,285	.....
1811	35,828	2,150,000	.....	752,553	.....
1812	26,094	1,514,000	.....	588,618	.....
1813	5,314	319,000	.....	283,512	.....
1814	3,125	232,000	.....	79,377	.....
1815	85,337	8,235,000	.....	1,034,045	.....
1816	69,241	12,800,000	.....	576,246	.....
1817	68,365	9,230,000	.....	1,115,874	.....
1818	84,337	10,241,341	.....	1,486,240	.....
1819	69,427	8,874,167	.....	926,833	.....
1820	83,940	8,188,188	.....	593,358	.....
1820–21	66,858	5,648,962	44,552	1,332,949	149,083
1821–22	83,169	6,222,838	44,602	1,414,424	157,182
1822–23	99,009	6,282,672	36,684	1,987,507	154,955
1823–24	77,883	4,855,566	45,174	2,477,990	203,789
1824–25	75,984	6,115,623	53,920	1,871,368	172,353

* Formerly, hogsheads of tobacco were much lighter than at present, owing to the less compact manner of packing, averaging only about 600 pounds prior to 1770, but gradually reached an average of 1,000 pounds. The present average of those of the tobacco-growing States is estimated at 1,200 pounds. Those of Kentucky often exceed 1,300 pounds each.

Years	Tobacco.	Value of tobacco.	Snuff.	Tobacco manufactured.	Value of snuff and tobacco manufact'd.
	Hogsheads.	Dollars.	Pounds.	Pounds.	Dollars.
1825–26	64,098	5,347,208	61,801	2,179,774	210,134
1826–27	100,025	6,577,123	45,812	2,730,255	239,024
1827–28	96,278	5,269,960	35,655	2,631,411	210,747
1828–29	77,131	4,982,974	19,509	2,619,399	202,396
1829–30	83,810	5,586,365	29,425	3,199,151	246,747
1830–31	86,718	4,892,388	27,967	3,639,856	292,475
1831–32	106,806	5,999,769	31,175	3,456,071	295,771
1832–33	83,153	5,755,968	13,453	3,790,310	288,793
1833–34	87,979	6,595,305	57,826	3,956,579	328,409
1834–35	94,353	8,250,577	36,471	3,817,854	357,611
1835–36	109,442	10,058,640	46,018	3,246,675	435,464
1836–37	100,232	5,795,647	40,883	3,615,591	427,836
1837–38	100,593	7,392,029	75,083	5,008,147	577,420
1838–39	78,995	9,832,943	42,467	4,214,943	616,212
1839–40	119,484	9,883,957	37,132	6,787,165	813,671
1840–41	147,828	12,576,703	68,553	7,503,644	873,877
1841–42	158,710	9,540,755	42,668	4,434,214	525,490
1842–43	94,454	4,650,979	20,455	3,404,252	278,319
1843–44	163,042	8,397,255	28,668	6,046,878	536,600
1844–45	147,168	7,469,819	44,399	5,312,971	538,498
1845–46	147,998	8,478,270	52,458	6,854,856	695,914
1846–47	135,762	7,242,086	37,051	7,844,592	658,950
1847–48	130,665	7,551,122	36,122	6,698,507	568,435
1848–49	101,521	5,804,207	49,888	7,159,397	613,044
1849–50	145,729	9,951,023	44,690	5,918,583	648,832
1850–51	95,945	9,219,251	37,422	7,235,358	1,143,547
1851–52	137,097	10,031,283	58,475	8,436,153	1,317,622
1852–53	159,853	11,319,319	39,641	10,561,692	1,671,500

According to the census of 1840, the amount of tobacco raised in the United States was 219,163,319 pounds; of 1850, 199,752,655 pounds; showing a decrease of 19,410,664 pounds. The crop of 1853 may be estimated at about 199,000,000 pounds; which, at 10 cents per pound, would be worth $1,990,000.

CONDENSED CORRESPONDENCE.

Statement of R. H. PHELPS, *of Windsor, Hartford county, Connecticut.*

The valley of the Connecticut, where I reside, is particularly noted for the production of tobacco; and I believe no part of the United States produces it of better quality, and quantity per acre. This crop has been on the increase for some years, and many of our farmers are discovering that they can procure more ready cash from this than from any other; indeed, a single crop will often bring more money than the same land can be sold for. The yield from one acre in this town has

been sold, in one instance, for $340. An ordinary crop will yield about 1,800 to 2,000 pounds per acre, and even 2,500 pounds are sometimes obtained. Our tobacco has of late years brought from 10 to 15 cents per pound, and in some instances 17 cents, delivered within two or five miles from the farm. Some of our farmers say that no more labor is required to produce an acre of tobacco for market, than two acres of corn. "Connecticut seed-leaf" generally stands highest in the market.

I have been inquired of from the South, whether the raising of tobacco will not eventually deteriorate our land, as it has done there. I answer no, so long as the soil is amply fed by manure, as it positively must be, to get crops good in quantity and quality.

The Connecticut mode of management is nearly as follows: The seed is sown as soon as the ground is free from frost; or if not, a quantity of bushes is burned upon the ground to warm it, and kill all the seeds of weeds, &c. It is then trodden down compactly, in order that the seeds, which are small, may come closely in contact with the earth. Guano is said to act with good effect in giving the plants an early start, which is to be attained if possible. In the field, a porous soil is preferred which has depth and strength, not tenacious with clay, nor containing a superabundance of water. From fifteen to twenty-five ox-cart loads of manure are spread upon the land about the first of May, and immediately ploughed under to a good depth. It remains in that condition until the 15th of June, or until the leaves of the plants are about the size of a silver dollar. A moist time is preferred to set out the plants, which are placed in rows about 3 by 3½ feet apart. The ground is then kept well hoed, and stirred with the cultivator and horse-plough until the size of the plants prevents further tillage. The large green worm is then the great enemy, and follows up its depredations until found and destroyed. A great deal of close attention is required in discovering this depredator, and a good flock of turkeys will sometimes be of as much service as a multitude of hands.

I have known a fine crop of tobacco raised by turning under a grass sward early in the spring, applying a dressing of manure, and harrowing it in, just before the plants are set in the ground. In case of a dry summer, the inverted turf will retain moisture sufficient to sustain the crop in vigor. When the blossoms begin to appear on the stalks they are topped or pinched off, and the "suckers" broken as fast as they appear. At maturity the plants are cut and remain on the ground until a little wilted, so that they will handle without breaking; they are then conveyed to the barn or shed, with tight roofs, and there suspended on poles. They hang until cured sufficiently for the leaves to be stripped and packed away for market.

I would say, in conclusion, that no good farmer, who desires to produce large crops of hay or grain, can successfully appropriate a large part of his farm to tobacco, unless he purchases or manufactures a great amount of manure, which must be applied in the cultivation of this hungry crop.

Statement of JOSEPH CORNISH, *of East Granby, Hartford county, Connecticut.*

The raising of tobacco has become a large interest in this county, especially in those parts lying on the Connecticut. The average product per acre is from 1,800 to 2,500 pounds. The value, when ready for market, is $12 per 100 pounds. Cost of production, $8 per 100 pounds, including manures. Guano is used as a fertilizer in its culture, with good results.

Statement of JOHN VARDEN, *of Washington City, D. C.*

Some nine or ten years since I obtained of the Commissioner of Patents a small parcel of Havana tobacco-seed, which I sowed, and placed the box containing them in the south windows of the National Gallery, with some flowers I was then cultivating.

The growth of these seeds I transplanted into a box, 4½ feet long, 10 inches deep, and 10 wide. Thus situated, the plant continued to grow, flower, and seed for five consecutive summers and four winters; and would, in all probability, have continued to flourish had I not cut it down.

Last spring I had living five plants from the seed of the old stalk. One of them, three years of age, had flowered two summers; and one of them, two years old, had bloomed one summer. The rest of the plants were started in the fall of 1852; and in the spring of 1853, they were transplanted into the open ground. These plants all grew finely, and reached the height of eight or nine feet; bearing leaves, which were of a bright golden yellow when matured, from 18 to 24 inches long by 12 to 16 wide. The plants have since died from exposure to frost.

Statement of EDWIN WINSHIP, *of Winship's Mills, Clinton county, Indiana.*

Tobacco is cultivated to a considerable extent in this State. The amount of labor required to raise it profitably is so great that its cultivation in many places is abandoned. It should be grown on very rich land, which will generally make from 1,000 to 1,200 pounds to the acre. Ordinary land will not make more than half that quantity.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

Tobacco is raised very extensively in this State, and of various qualities. Its cost of production to the acre, in consequence of the care required in its culture, is greater than that of any other crop we raise, and its proportionate value is greater. The expense of an original outlay in houses, and the necessity of its culture on the most fertile lands, will prevent this crop from being a very general one with our farmers. It is an exhausting crop, while hemp, on the contrary, is considered a fertilizer; the same land being cultivated with the latter staple for a great number of years with increased production.

On the alluvial soils of this State the average product of tobacco is 1,200 pounds to the acre; on lighter soils, 1,000 pounds. The prairies

are not considered generally as very favorable to the production of the larger varieties of this plant, on account of the prevalence of high winds. The price now varies from $5 to $10 per 100 pounds.

Statement of H. L. Brown, *of Fayette, Howard county, Missouri.*

A great deal of tobacco is raised in this county, as it readily brings cash. The average yield can more nearly be estimated than that of any other crop, and may be put at 1,000 pounds to the acre. Cost of production, $3 per hundred.

Statement of D. C. Garth, *of Huntsville, Randolph county, Missouri.*

The crops which can be cultivated to the best advantage in this section, are tobacco, corn, and oats. The maximum yield is about 2,000 pounds to the acre; the average, about 1,000 pounds; and the smallest yield that will pay expenses, 500 pounds to the acre.

Statement of D. Nevinger, *of Farmersville, Montgomery county, Ohio.*

This county, for several years past, has produced $100,000 worth of tobacco per annum. The price has been rather too fluctuating for one to engage in its culture to any great extent. The crop of 1850 readily sold at an average of 10 cents per pound; in 1851, at about 4 cents; in 1852, at 7 cents per pound.

From the common Connecticut "seed-leaf," I raised, last season, 1,200 pounds per acre, which will sell, perhaps, for 10 cents a pound.

HOPS.

The hop, so extensively cultivated in the field for breweries, and so well known to every housekeeper for culinary use, appears to have been unknown to the ancients; although we are ignorant of the country from which it was derived. It was mentioned by Joan. di Cuba, in his "Ortus Sanitatis," as growing in Holland prior to 1485, when its properties and uses were well understood. Its culture was introduced into England, from Flanders, in 1524; but its strobiles were not used to preserve English beer before the latter part of the reign of Henry VIII. At first, there was a strong prejudice against them; and a century after, a petition was presented to Parliament from the city of London to prohibit their use.

This plant was introduced into the British North American colonies soon after their settlements by Europeans. It was enumerated among the products ordered by the "Governor and Company of the Massachusetts Bay in New England," in 1629. It was also cultivated in New Netherland as early as 1646, and in Virginia previous to 1648. The growth of hops was encouraged in the last named colony by legisla-

tive acts, in 1657. In 1680, the price of malt in Portsmouth, New Hampshire, was 4 shillings per bushel.

The quantities and valuation of hops of domestic growth, exported from the United States within the last thirty-three years, are exhibited in the following table:

Years.	Hops.	Value.	Years.	Hops.	Value.
	Pounds.	Dollars.		Pounds.	Dollars.
1820–21	319,501	18,498	1837–38	854,106	53,602
1821–22	283,200	23,025	1838–39	747,164	72,425
1822–23	249,927	27,124	1839–40	82,086	11,235
1823–24	389,788	81,810	1840–41	176,619	28,823
1824–25	117,623	13,865	1841–42	339,181	36,547
1825–26	388,718	100,668	1842–43	1,182,565	123,745
1826–27	88,460	8,284	1843–44	664,363	51,550
1827–28	375,058	25,432	1844–45	902,072	90,341
1828–29	128,482	6,917	1845–46	287,754	41,692
1829–30	383,060	30,312	1846–47	1,227,453	150,654
1830–31	265,043	26,664	1847–48	257,016	17,671
1831–32	184,729	25,448	1848–49	411,164	29,123
1832–33	468,798	92,963	1849–50	1,275,455	142,692
1833–34	917,600	164,577	1850–51	110,360	11,636
1834–35	625,684	90,720	1851–52	238,008	69,042
1835–36	207,548	25,886	1852–53	245,647	40,054
1836–37	1,096,428	89,705			

According to the census of 1840, the amount of hops raised in the Union was 1,238,502 pounds; of 1850, 3,497,029 pounds; showing an increase of 2,258,527 pounds. The amount raised in 1853, may be estimated at 3,000,000 pounds; which, at 15 cents, would be worth $450,000.

CONDENSED CORRESPONDENCE.

Statement of C. E. POTTER, *of Manchester, Hillsborough county, New Hampshire, in behalf of the Committee on Root and Grass Crops, of the Agricultural Society of that State.*

The committee would suggest that, in their opinion, the more general introduction of hop culture would be of great advantage to the agricultural interests of the State; as most farmers could cultivate it with a very slight drawback upon their other agricultural operations, and the product is one that finds a ready market, and generally at a paying price. True, the prices are fluctuating; but it is questionable whether the average price of hops for the last forty-eight years, in New England—being about 13 cents per pound—has not paid a greater

profit than the growing of any other article of agricultural produce during the same period. Any land that will produce corn well, will grow hops; and an acre of roots well cultivated upon good soil, will produce 1,000 pounds; which, at the average price, would be $130 for the produce of an acre. General W. P. Riddle, a dealer in, and inspector and grower of, hops for the last forty years, informs us that the cost of raising a pound of hops, including cultivating, picking, curing, and pressing, is 5 cents. This would leave $80 as net profit upon an acre, or 1,000 pounds of hops, at the average price of hops for the last forty-eight years. Now deduct from this, say $30 upon 1,000 pounds, to meet the interest on fixtures, expense of marketing, the loss from keeping over, and all other risks, and put the net profit of an acre, or 1,000 pounds, at $50, and what other agricultural product grown among us can compete with the hop? Through the politeness of General Riddle, we are enabled to lay the following table before the society, showing the amount of hops raised per annum, and the prices paid for them, in New England, for the last forty-eight years:

Years.	Bales.	Pounds.	Average price in cents.	Value.
1806	910	378,221	15	$41,733 15
1807	1,167	369,496	11	40,644 56
1808	1,071	322,976	10	32,297 60
1809	993	280,063	10	28,006 30
1810	1,124	299,500	27	80,865 00
1811	1,519	416,050	7½	31,203 75
1812	1,267	322,913	1½	40,364 12
1813	967	243,242	22	53,513 24
1814	767	179,640	25	44,910 00
1815	1,434	331,673	30	99,501 90
1816	1,336	286,374	32	91,957 68
1817	3,087	729,862	34	248,153 08
1818	2,709	616,366	14	86,291 24
1819	2,834	656,902	5	32,845 10
1820	3,555	782,663	6½	50,873 09
1821	2,659	561,063	7½	42,079 72
1822	2,810	548,709	10½	57,614 44
1823	2,936	618,444	20	123,688 80
1824	2,720	575,030	10½	60,378 15
1825	3,054	621,241	15	93,186 15
1826	2,134	409,007	15	61,351 05
1827	3,766	752,140	7	52,649 80
1828	3,391	678,410	6	40,704 60
1829	3,179	632,806	5½	53,788 51
1830	3,874	769,456	11	84,640 16
1831	3,691	730,736	10½	73,439 46
1832	3,179	666,602	23½	142,551 47
1833	5,839	1,136,134	16	181,781 44
1834	6,151	1,174,599	14	164,423 86
1835	4,936	963,238	9½	91,507 31
1836	7,608	1,441,936	7½	108,145 20
1837	5,197	940,857	6	56,451 42
1838	3,562	663,766	15	99,564 90
1839	2,390	452,225	15	67,833 07
1840	2,892	534,404	30	160,321 20
1841	2,948	564,917	12½	70,614 62
1842	4,543	922,932	8	73,834 56
1843	3,329	640,085	f	38,405 10

Years.	Bales.	Pounds.	Average price in cents.	Value.
1844	4,060	773,362	9½	$73,469 39
1845	3,158	603,763	15	90 564 40
1846	5,625	911,768	8	72,941 44
1847	3,528	697,439	6	41,846 34
1848	3,680	745,916	7	52,214 12
1849	4,320	707,856	12½	88,482 00
1850	2,777	528,685	25	107,164 50
1851	2,678	537,668	25	109,417 00
1852	4,388	839,723	20	167,964 60
1853	3,496	649,076	30	192,022 80
	149,238	30,941,902		3,998,224 02

The average price of hops per pound for forty-eight years, is 12⅘ cents.

The whole amount of hops grown in the United States for the year 1849, as computed in the census returns of 1850, is ..... 3,497,029 pounds.

New England raised..... 707,743 pounds.
New York raised..... 2,536,299 "

3,244,042 "

Balance for other States..... 252 987 "

From the above table it will also be seen that the price of hops during forty-eight years never has gone below 5 cents per pound, the actual cost of growing. Of what other agricultural product can the same be said, that is grown in New England? Then, this very year, and at the time of writing this report, hops readily bring 45 cents per pound, giving the enormous profit of $450 per acre.

HOP CULTURE.

BY LORENZO ROUSE, OF PARIS HILL, ONEIDA COUNTY, NEW YORK.

In looking over the Patent Office Reports, more especially those of the last six years, I am unable to find anything relating to the *hop crop* of the United States, either as to its amount, or the mode of cultivation.

The crop is one in which many of the farmers of this county, and of the adjoining counties of Madison and Otsego, are largely interested—more so, perhaps, than those of any other portion of the Union. Being favored with a soil happily adapted to the wants of the plant, most of those engaged in it have been quite successful in its cultivation, and the hop-growers of this region have already established a high reputation for the superiority of their crops, both as to quantity and quality.

While they generally produce an article that commands the very highest price in market, some, especially in the southern part of this county, have obtained yields which it is believed have never been exceeded, if ever equalled, in any part of the world.

The hop *(Humulus lupulus)* is too generally known to render an extended description of it necessary. Still it may not be improper to say, briefly, that it is a perennial plant, epiphytic in its character, with vines weak and slender, and sometimes growing to a great length, needing support, and readily attaching themselves to, and winding around, any suitable substance within their reach. For this reason, Dr. Webster supposes the name of the plant may have been derived from the word *hoop*, from its winding about or encircling whatever it attaches itself to. The strobiles, or blossoms, are cruciform, and grow in clusters on the upper portion of the vine. Under favorable circumstances these are produced in great profusion; so much so, indeed, that the plant has sometimes been considered as an emblem of fecundity. With this significance it was formerly used by the Russians at their nuptial ceremonies.

The blossoms, which may, at the same time, be also termed the *fruit* of the plant, are the only part of it that is valuable. They are quite bitter to the taste, and are slightly narcotic. They are considered of great importance in brewing, their tendency being to preserve malt liquors, and, as is supposed, to render them more salubrious.

The plant requires a climate rather cool and moist for its most successful cultivation; and for that reason, perhaps, it has been brought to greater perfection in England than in this country. Still, with deep tillage, on suitable soils, it is enabled to withstand successfully our American summers, if the ground is kept mellow, as the roots will penetrate to a great depth, and thus obtain the necessary supply of moisture, a superabundance of which would, however, be as injurious to this as to other plants.

The cultivation of the hop in this country may be considered as yet comparatively in its infancy. The quantity grown in England exceeds probably that of any other portion of the world of equal extent. Its importance there may be inferred from the number of acres in cultivation. I have not the means of ascertaining precisely what that is at present; but as far back as 1836, it was stated to be 55,422 acres, and it is presumed that it is fully equal to that now. The principal hop-growing counties are Kent, Surry, and Worcestershire. The latter has annually 4,000 acres devoted to the crop—a quantity equal, probably, to the entire crop of the State of New York, which is by far the greatest hop-growing State in the Union; the yield in this State, in 1849, having been, according to the census of 1850, more than five-sevenths of the produce of the whole United States. It would seem, however, that the cultivation is rapidly increasing in this country, there having been an increase from 1840 to 1850, of nearly 200 per cent. It appears also that nearly the whole increase has been in this State, which, from less than half a million pounds in 1840, returned more than two and a half millions in 1850; showing an average annual increase of 40 per cent. The entire crop of the United States in 1850, was 3,497,029 pounds. Of this quantity, 2,536,299 pounds were the product of this

State, and the remainder, 960,730 pounds, was principally made up by the New England States, together with Ohio, Indiana, and Michigan. Nearly every State in the Union, however, contributed a portion; but in most of the Southern States the quantity was merely nominal.

It will be perceived from this statement that New York is the greatest hop-growing State of the Union; and it may not be improper to mention, in this connection, that she is also the greatest consumer, standing forward as she does in the manufacture of malt liquors, requiring the consumption of the larger portion of the hops she raises. In 1850, the breweries of this State produced 645,000 barrels of ale, beer, &c., which was more than one-third of the quantity returned for the whole Union. It would seem, however, that the supply of hops grown in this country is not all required for home consumption, as more than one and a quarter million pounds—a quantity exceeding the whole produce of the United States, except New York, in 1850—was exported during that year, about one-half of which went to the English market. But the export of 1850 was an unusual one as to quantity, and would furnish no safe criterion for an estimate, as is shown by comparing it with that of the succeeding year, in which it fell to less than one-tenth part of that amount.

This occasional foreign demand has a tendency to affect materially the prices in this country, and its irregularity produces great fluctuations in the market. Although hop-growing has generally proved profitable in this State, still this great variation in price renders the business one of more than ordinary risk. This has not only deterred many from entering into the business who would otherwise have been likely to have done so, but has also induced many growers to turn their attention to other branches of agriculture. While, therefore, there has been a rapid increase in the production during the last ten years, that increase is probably small to what it would have been, had there been more stability in the market, prices having ranged in that time from 6 up to 40 and even 50 cents per pound. Although the latter prices, if sustained, would have afforded the producer a very rich profit, still he feels no assurance that they will not, before he can prepare his field and mature his crop, fall to rates that will prove absolutely ruinous.

In the cultivation of hops, one of the most important things necessary is, the selection of a suitable piece of ground, not only as regards the soil, but also with reference to location. The soil should be both rich and deep. That depth of soil is of consequence, is evident from the fact that the roots not unfrequently penetrate directly downwards to the depth of three or four feet. They have also been known to extend laterally to a distance of twenty feet. Some cultivators, it is true, do not deem an unusual depth of soil of much consequence, and very many are of opinion that any good strong soil that is suitable for corn, may, by proper cultivation, be adapted to the wants of this plant. English hop-growers are of opinion that, in order to produce the best quality of hops, the substratum of the soil should be calcareous. With us, such a substratum is not so readily to be met with. It is evident, however, that such soils as are composed of, or contain certain necessary elements, essential to the growth of the plant, are best adapted to its successful cultivation. What those elements should be, can be best

ascertained by a careful analysis of the plant for the purpose of ascertaining what ingredients enter most largely into its composition. This has been done by one competent to the task, with the following result, viz:

Composition in 100 *parts of the inorganic matter contained in the ash of the plant and blossom.*

Silica	13.24
Chloride of sodium	7.73
Chloride of potassium	3.77
Soda	0.13
Potash	21.49
Lime	34.79
Magnesia	4.09
Sulphuric acid	4.63
Phosphoric acid	6.34
Phosphate of iron	3.79
	100.00

The quantity per cent. of these mineral ingredients that are contained in the plant is about 9, or, more accurately, 8.8 per cent. From this analysis, the intelligent cultivator will at once perceive what ingredients are more particularly essential in the soil, and make his selection accordingly; and should any one of them be wanting, he will be enabled to adapt his manures with reference to the supply of that particular deficiency.

The next thing to be considered is locality. The field should not be in an exposed situation; otherwise, much loss may be sustained by the poles being blown down when loaded; and even if this does not occur, the hops are liable, when near maturity, to be bruised, and the branches broken off, by high winds. The ground should also be level, or nearly so; otherwise, the high cultivation necessary, which should keep the ground constantly loose and mellow, will render it liable to wash and gully. For this reason, steep hill-sides should, by all means, be avoided. If practicable, the field should be selected at least one year previous to that in which the hops are to be planted, in order that it may be put in a proper state of cultivation, which can be most readily done by high manuring, and by thorough culture with some hoed crop. It would, indeed, well repay the expense to subject it to the best garden cultivation from the commencement.

The time for planting having arrived, which with us is usually about the first of May, the ground should be marked both ways with a line, or otherwise, so that the rows shall be perfectly straight, and crossing each other exactly at right-angles. Care, in this respect, not only adds much to the beauty of the field, but facilitates the cultivation. Hop-growers differ in opinion as to the distance which the rows should be made apart, ranging from six to eight feet; a medium between the two is, perhaps, to be preferred—such as will give 888 hills to the acre. When set in this manner, two poles will be necessary for each hill, and two, or at most three vines, will be allowed to each pole.

The plants may be procured from cuttings, or from the seed. Those procured directly from the seed are preferred in England to cuttings, as being more luxuriant in their growth when matured, and much less liable to be affected by the blight. Plants raised from the seed will not require to be poled till the third year, while those raised from cuttings will be ready the second year. The latter is the method almost universally adopted in this country. These cuttings, or layers, are procured without much expense, and are taken from fields already in cultivation, usually at the time of the spring dressing, by taking the head of the root, and the upper branches which form near the top of the ground, and are called runners. The head of the root is undoubtedly to be preferred, as being larger and more vigorous; but it is not always practicable to obtain a sufficient number of these, and the runners are therefore used with them, indiscriminately. These runners are full of joints, or eyes, and are cut in pieces containing two or three sets of eyes each. These are planted at the intersection of the rows in the field, by placing three or four in a hill at a little distance from each other, and may be laid down horizontally and covered with earth, or set in perpendicularly by making a small hole in the ground with a stick, and the earth then pressed around them. As the plants require no poling the first year, and do not produce any crop, the ground may be planted with corn between the rows. This will give three-fourths of a corn crop, which will be cultivated in the usual manner, and the hops hoed at the same time. Nothing more will be necessary the first year.

The field will be ready to be poled the second year, which should be done as soon as the frost is out, and the ground settled. The poles should be from 18 to 25 feet in length, according to the strength of the plants, and usually consist of cedar, pine, spruce, ash, or chestnut. Cedar poles are generally preferred, as combining both the desirable properties of lightness and durability. They are sharpened at the bottom with a regular taper, and firmly set in holes made with a heavy crowbar, two poles to a hill, standing about a foot apart, north and south, if practicable. The tops should be inclined a little apart, as this will give the vines more room, and prevent their becoming intertangled.

As soon as the vine is of sufficient length, it is coiled around the pole and fastened by tying, for which purpose a piece of woolen yarn is most suitable. This operation should be repeated from time to time as may be necessary. Two, or, if small, three vines are sufficient for a pole, and all extra vines should be cut off, or pulled up, so that the whole force of the plant may be directed to those on the poles. The ground should be kept perfectly clean between the hills by a free use of the plough or cultivator, worked both lengthwise and across the field, and the hills should be kept entirely clean and free from weeds and grass. This should be done without hauling dirt to the hills, as these should be left quite bare till after the disappearance of the grub, which frequently preys upon the vine just at the top of the ground, and will commonly be found to have finished his work early in July. Then the field may be hilled, after which it should be left till the picking season arrives.

The hop is an enduring plant, and it is said that some fields in England have been cultivated with it beyond the memory of man. Still it is deemed

best to renew the field once in about twelve or fifteen years, as the plant seems to lose its vigor in a few years after planting. The first crop cannot be expected to be a full one, as the plants have not yet attained maturity. After that, for some three or four years, the field will probably be in full vigor, and yield its most abundant crops; after which, a gradual decline will most generally be noticed, and a consequent falling off in the yield. This may be in some measure prevented, and the crop greatly benefited, by liberal manuring; and each hill should receive a good top-dressing of manure every year. This may be applied most conveniently in the fall or winter, while the poles are pulled.

The hills will probably not need grubbing the first season they are poled, but after that they should receive it annually. This should be done in the spring, by bringing the hill, which was formed by the dressing of the preceding year, to a level with the surrounding earth, or perhaps a little lower, and thoroughly cleansing it by removing all the unnecessary roots and superfluous shoots and runners. These should be cut off near the hill, in order that they may not take up the sap that should go to the vine. This grubbing is found to be highly advantageous, as giving the plant new vigor, and being conducive to its health and permanency. After the operation is completed, a little of the top-dressing should be drawn into the trench formed around the hill, and covered with fresh earth. The field will then be cultivated through the season as already described.

The hops having reached maturity, or nearly so, the operation of picking commences. This, to have the fruit in full perfection, should not be done till it is ripe; at which time the seed will be found to have changed from a bright straw-color to a pale brown, and will emit a fragrant smell. I am here reminded of what I have omitted to mention in its proper place, namely: that in hops the male and female plants are distinct, and it is necessary that a small number of the male plants should be interspersed among the others, in order to give that energy and vitality to the seed which is essential to the perfection of the crop. If due care is taken in this particular, a seed will be found at the bottom of each petal of the blossom possessed of a most pungent aromatic flavor. Attention to this particular is indeed necessary to insure flavor and character to the product of the plant, giving it that fine aromatic bitter which is most desirable, and which it will not otherwise be possessed of; the petal or leaf of the blossom containing comparatively but little of the astringent quality of the hop. This consideration is one which, I apprehend, is too frequently overlooked by the inexperienced cultivator, who sometimes rejects the male plants as barren, to the great injury of his crop. One of these plants in fifty would be a sufficient proportion; even a less number might answer.

But to return to hop-picking. With us hops are usually ripe about the 5th of September; but as it is better that they should be harvested rather green than be permitted to stand till over-ripe, liable to be injured by the early frosts, and as they cannot all be gathered at once, it is necessary in large fields to commence somewhat earlier—usually about the first of September—in order that the work may be completed in season. The picking is usually done by females. For this purpose girls are frequently engaged several months, and even a whole year, in

advance; and when there are several hop-growers in the same vicinity, there will be a great demand for this kind of labor; making it sometimes necessary to look for it at a distance of twenty miles, or even more. It seems, however, to be a business that is quite popular with young persons; and many girls who would scorn to go out to service in any domestic employment, are quite ready to engage at hop-picking. The hop-picking season is indeed to them quite a carnival; and many things are tolerated in the hop-field that would be considered not strictly proper in any other place.

The hops are commonly picked in large boxes containing from 24 to 40 bushels. These boxes are divided lengthwise by a thin partition, and then subdivided into quarters. They are raised a little from the ground, and have handles at the ends to facilitate their removal from place to place as may be desirable. One man and four girls are allowed to each box. Each girl deposites the hops she picks in her own division of the box, and is paid for what she picks at the rate of from two to three cents per bushel. An industrious hand can pick 20 bushels in a day without difficulty. It is the business of the man, or tender, as he is called, to supply the boxes with poles, (which he raises from the ground as needed, cutting the vines about a foot high,) to see that the picking is properly done, to remove the empty poles, clear them of the vines, and stack them in a systematic manner. In picking, the hops should be kept free from stems and leaves, and all blasted or immature ones should be rejected. The boxes should be emptied at least once a day; at all events, no hops should be left in them over night. It is of great consequence that they should be dried as soon as possible after they are picked, as they are quite liable, if left together in any quantity, to heat and spoil in a few hours. They may be most conveniently conveyed from the field to the dry-house in large sacks.

The operation of drying is one of great nicety, for the strength and flavor of the hop are quite volatile. The hop-house, or kiln, should be of a size proportionate to the quantity of hops to be cured, so that they may not accumulate on hand. To avoid this, it will generally be necessary to keep the kiln heated both day and night. It is commonly built of an oblong form, and of two stories; the lower part being occupied by the kiln and the press-room, and the upper part by the drying-floor over the kiln, and by a room of about an equal size for storing the dried hops, which will of course be over the press-room. Kilns are sometimes built of bricks or stone of a circular form, with a round opening in the apex of the roof, surmounted by a movable cowl, or swinging ventilator, to enable the vapor of the drying hops to escape easily. If the building is of wood, the sides of the kiln should be lined with brick-work, or thoroughly lathed and plastered. It is found to be most convenient and economical to heat it with stoves, from two to four of which will be necessary, according to the size of the kiln. The drying-floor should be at 10 feet from the ground, that there may be no danger of scorching the hops in drying. This floor is formed of slats about one and a half inches in width, and the same distance from each other. These are covered with a strong coarse cloth of open texture, so as to admit of a free transmission of the heated air from the kiln below. The drying-room should be of comfortable height for a person to work in it; and the

sides should be lathed and plastered, that there may be no irregularity of the heat in different portions of the room during high winds. A good ventilator should be provided in the roof as described above. Openings should be left in the walls near the bottom of the kiln to admit fresh air from without; the draught to be regulated by means of flues, or sliding-doors. The cloth for the drying-floor should be well stretched over the slats and firmly nailed. On this floor the hops are spread to the depth of six or eight inches. The proper thickness will depend somewhat on the condition of the hops; if they are very full of moisture they should be laid on quite thin; but if gathered when fully ripe, and in fine weather, a depth of 10 inches will be allowed.

The hops being spread as evenly as possible, the fires are immediately kindled in the kiln, and the temperature regulated to one uniform degree of heat. This, however, may be quite high at first, as there will at that time be but little danger of scorching the hops if the floor is sufficiently high. If the hops are rusty, or discolored from any other cause, it is usual to burn a little sulphur under them, which will bring them to a uniform appearance. This is done as soon as the hops are well warmed through, and feel somewhat moist. Great prejudice formerly existed against the use of sulphur in drying hops; but no objection is now made to it by the brewers, and it is generally thought that the use of it improves the appearance of all hops, and that it also facilitates the drying.

During the drying process, the fires should be kept up, and there should be a free supply of fresh air from below, sufficient to keep up a regular succession of heated air from the kiln, passing through the hops, and out at the ventilator, carrying with it the vapor expelled from the drying hops. This will be found far preferable to a still, dead-heat. As soon as the upper part of the hops appear to have felt the fire, the lower part may be considered as nearly dry, and will rattle a little. The heap may then be turned. Before this is done, the heat should be suffered to abate a little, and increased again after the turning is finished. I am aware that many do not turn their hops while drying, nor suffer them to be disturbed at all until they are ready to be removed from the floor. Still, the better opinion, I think, is in favor of turning, as tending to facilitate the drying and to render it more perfect by the more effectually exposing every portion of the mass to the action of the heated current of air, than would be the case were they allowed to remain as first deposited on the floor, containing many inequalities in density, even when the utmost care is exercised in their distribution. If turned at the right time, and in a careful manner, there need be no injury done to the hops. As has been already said, the drying process is one of great nicety, and no precise rules can be given in relation to it. Everything will depend on the judgment and experience of the person having charge of the kiln. They should be dried sufficiently, but at the same time not too much, and it will be for time to determine, by careful examination, precisely when the right period has arrived. To enable him to do this correctly, a little practical experience will be of more value than any amount of written instructions that can be given. When sufficiently dried, they should be allowed to cool off a little, if time can be afforded; otherwise, there will be great danger

that they will break in moving, or a portion of them shell off and waste. Ten or twelve hours are required to dry a kiln of hops. Two kilns may be dried in twenty-four hours by keeping the heat up through the night. A twenty-foot kiln will thus dry 400 bushels in a day, as they come from the vines, making about 750 pounds of hops when dry.

The hops being dried, the next process is to bale them. This should not be done immediately after they are taken from the kiln, but they should be allowed to lie a few days in the store-room till they become a little softened; otherwise, their extreme brittleness will cause them to be much broken in baling, and the sample be thereby greatly injured. The bales should be of symmetrical and convenient form, and should contain about 200 pounds. They are formed in a box or bin prepared for the purpose, in the press-room, of such shape as will give the desired size and form. Across the bottom and sides of this box the baling-cloth is first laid, and the hops are then let down into it from above, and trodden down as they are dropped in, until it is filled. Another cloth is then carried over the top, a follower applied, and the screws of the press turned down upon it until the whole is brought into a compact mass. The box is then taken apart, the cloth neatly secured round the bale, the screws are run up, the bale taken out and the ends cased, when it may be considered finished, and the same process is repeated in forming another. This method is, I believe, almost universally preferred in this country, but I understand that in England the press is seldom if ever used. The sack is suspended from the floor of the store-room by means of a hook, which also serves to keep the mouth of it open. The packer gets into the sack, and drawing the hops in as they are wanted, treads them down with his feet as closely as possible till the sack is filled. This method was formerly pursued in this country, but has been almost entirely abandoned by those who raise hops for market.

The yield of hops is so variable that it is very difficult to determine what may be considered as an average crop. Very much depends, of course, on the fitness of the soil, the quantity of manure applied, and the amount of cultivation. Then, again, very much will depend on the season. This year, for instance, has proved to be very unfavorable, the yield being only about one-third of a full crop. One hop-grower of my acquaintance has obtained but 12,000 pounds from grounds which last year produced 32,000; and another has only 4,000, where last year he obtained 16,000. The universal complaint is, that the crop has been very light. Taking one season with another, the range of different fields is from 400 to 2,000 pounds to the acre. Instances have, indeed, occurred occasionally, in which the latter quantity has been exceeded, and in one instance an average of near 2,800 pounds was obtained. In another case 2,886 pounds were gathered from a single acre, which is claimed to be the largest yield on record. One thousand pounds per acre may be considered as a fair crop; but the general average would no doubt fall below that, and would probably be about one pound per hill, or 888 pounds to an acre.

As to the cost of production her pound, it is probably still more difficult to make an accurate average estimate. It depends, in a great degree, on causes which affect the quantity produced per acre, and

will be found to vary in different localities, according to the price of building materials, the cost of poles, and the facilities for procuring a good supply of manure. A hop-house, including a suitable kiln, drying-floor, cooling-room, and press, sufficient for a field of ten acres, would cost from $300 to $800, according to the materials used, and the pains taken in its construction. Then, again, in some localities, poles can be obtained for $5 per hundred, while in others it is difficult to procure them at even double that price. Taking all things into account, it may be safely estimated that the expense of starting a good field, including the necessary fixtures, will be at least $150 per acre.

The annual cost of cultivation will vary from $75 to $150 per acre, according to the amount of labor expended, and the quantity and value of the manure applied. This estimate should be considered as including also the expense of picking, the interest on the capital invested, the depreciation of the value of buildings, and the decay of poles. The yield may generally be expected to be somewhat in proportion to the amount of judicious expenditure bestowed on the cultivation, and it will probably be a reasonable estimate to put the average cost of production at 10 cents per pound.

It may be proper to add a few words, before concluding, in relation to the profits of hop-growing. It has already been shown that the market for the article is probably more fickle than for any other agricultural production. The crop itself being a precarious one, liable to injury or destruction from a number of causes, nothing certain in regard to the amount of the crop, nor the price that can be realized for it, can be calculated on. After having incurred a great outlay of expenditure in preparing the field and necessary fixtures, and in taking every precaution that human foresight can suggest, for the purpose of insuring a good crop, the expectations of the most careful cultivator may be cut off by the grub gnawing at the root, or the fly preying upon the vines; or his *hopes*, as well as his *hops*, entirely blasted by the rust, blight, or mildew. Prices have indeed ruled sufficiently high, during the last three years, to give to the producer good returns, even with short crops. It should be understood, however, that the hop-growers do not often obtain the highest prices at which the article is quoted in market. Many of these sell on contracts for a term of years, and the high prices to which the article is sometimes run up, is not unfrequently the result of the operations of speculators at a time when there is but little of the article remaining in first hands. Still, it cannot be denied that, taking a series of years in connexion, hop-growing has afforded good profits—better, probably, than almost any other branch of agriculture pursued in this region. Whether it will continue to do so for the future, must be entirely a matter of conjecture. With a good crop, and good markets, it must necessarily be a good business; but without both these in conjunction, it would probably afford no better returns than any other crops.

INDIGO.

This plant, so important in yielding a blue coloring matter, is a native of Industan, but has become naturalized in the West Indies, and other parts of the torrid zone. It was formerly cultivated to a considerable extent in Georgia and some other portions of the South, but the supply from India, and other places abroad, seems to have discouraged its production in that section, and the planters have turned their attention to more profitable crops. Indeed, the amount has been so small, that it was not deemed worthy of note in the census for the last fifteen years.

Indigo began to be cultivated in Virginia prior to 1648. In 1718, it was introduced into Louisiana by the "Company of the West;" and into South Carolina, from the West Indies, by Miss Eliza Lucas, the mother of General Charles B. Pinckney, in 1741. For ten years preceding 1743, the British Parliament granted to the patentees of Georgia £120,000 for the encouragement of this and other agricultural crops. It was cultivated at St. Augustine, in Florida, prior to 1770.

The amount of indigo exported from Charleston, South Carolina, in 1731, was 100,000 pounds; in 1747–48, 134,118 pounds; in 1754, 216,924 pounds; in 1760–61, 399,366 pounds; for a few years preceding the Revolution, annually, 1,107,660 pounds; in 1792, 2,458 barrels; in 1794, 2,157 barrels; from Savannah, in 1755, 4,508 pounds; in 1760, 11,746 pounds; in 1770, 22,336 pounds; from Philadelphia, in 1796, 99,200 pounds; from the United States, in 1794, 1,550,880 pounds.

The quantities and valuations of indigo of domestic production exported within the last thirty-three years, are indicated in the following table:

Years.	Indigo. Pounds.	Value. Dollars.	Years.	Indigo. Pounds.	Value. Dollars.
1820–21	1,004	714	1837–38	50	50
1821–22	3,283	2,399	1838–39	----------	----------
1822–23	2,990	2,314	1839–40	209	209
1823–24	818	836	1840–41	----------	----------
1824–25	9,955	7,034	1841–42	2,200	1,042
1825–26	5,289	3,922	1842–43	208	198
1826–27	13,589	8,358	1843–44	2,500	1,176
1827–28	2,684	1,495	1844–45	100	70
1828–29	----------	----------	1845–46	90	90
1829–30	1,140	827	1846–47	25	10
1830–31	----------	----------	1847–48	1,150	1,100
1831–32	----------	----------	1848–49	493	49
1832–33	300	180	1849–50	----------	----------
1833–34	102	148	1850–51	2,740	2,803
1834–35	1,031	1,060	1851–52	1,079	910
1835–36	1,065	1,020	1852–53	36	36
1836–37	----------	----------			

FRUITS.

When we consider the influence the cultivation of fruit exercises on the health and morals of a country, as well as on the wealth and luxury of the people, it may be truly said that he who devotes his life to the contribution and advancement of such influences confers as great a benefit upon them, and follows as honorable a calling, as the man who defends his country in time of war, or falls by the bullet or the sword. A productive orchard or a fruit garden is not only a luxury and a source of enjoyment to the farmer or man of wealth, but is essential to the health, comfort, and well-being of individuals of every class. It affords an amusement or occupation to be coveted beyond all others, and leads to nothing but good—to nothing sensual or vicious. It can give rise to no bad habits; but, on the contrary, will serve to protect a man from the allurements of dissipation and its consequent evils.

Our orchard and garden fruits have followed man from the earliest periods of civilization, and perhaps have been more studied, and consequently better known, than any other plants. There are two characteristics, however, concerning their cultivation, which are of great importance to cultivators. First, the liability of almost every sort to "sport" and produce varieties differing, in many cases, more from one another than they differ from other species. But let it be considered that when these varieties take place, they may not always tend to deteriorate the fruit, but may often result in an exchange of one good quality for another, or perhaps even exhibit an improvement in the qualities. For instance, we may at least expect to obtain early fruit from the seeds of that which is early, and from those of late fruit the reverse; and by parity of reason, from large or small, from sweet or sour, from juicy or dry fruit, we may also expect to obtain seedlings that will, in a greater or less degree, correspond to their origin—a result which it may often be an object for the prudent cultivator to secure. The second characteristic is, that nearly every class of fruit is remarkably subject to the attacks of insects and of disease; for trees, like animals, have inherent diseases, or a susceptibility to receive those peculiar to their species. Although insects are the direct source of many injuries to trees and their fruit, they are frequently met with in morbid parts, feculent or putrefying from previous malady, and may be regarded as the *effects* rather than the *causes* of disease; and accordingly should be treated in reference to these facts.

It may not be without interest to compare the valuation of orchard fruits cultivated in this country at different periods within the last fifteen years. In 1840, according to the census of that year, the value of orchard products was $7,256,904, besides 124,734 gallons of domestic wine. The census of 1850 gives $7,723,186 worth of orchard products, and 221,249 gallons of wine, showing only an increase of 466,282 in value of fruit, and 96,515 gallons in the production of wine; both of which are unquestionably too low. The amount of domestic wine made in the United States in 1853 may be safely estimated at 2,000,000 gallons; which, at $1, would be worth $2,000,000. Add to this $18,000,000 worth of strawberries, blackberries, raspberries, cranberries, and orchard products, the value of fruit, cider, vinegar,

and wine, of domestic growth and manufacture, would amount to $20,000,000.

FRUITS OF CENTRE COUNTY, PENNSYLVANIA.

By H. N. McAllister, George Buchanan, James Alexander, J. K. Shoemaker, *and* William J. Waring, *being that portion of their report which relates to fruits, to the Centre County Agricultural Society.*

The numerous exhibitions of fruit held of late throughout this and the other Middle States, have afforded full opportunities for comparing the appearance and merits of fruit grown in different districts. We have not seen nor heard of, within the limits of Pennsylvania, larger nor richer peaches, fairer and higher-flavored pears, handsomer and more abundant plums and cherries, than have been shown in Centre county. Apples and quinces are handsome and good, perhaps over an average in size; yet not so large as some we hear of in places out of the State. All these fruits grow with quite as little care as appears to be required in any other districts.

There is no doubt but that health, comfort, sociability, temperance, and good morals generally, would be promoted by making a choice fruit-garden as universal an appendage to a dwelling as a vegetable garden is now. But as yet, there is scarcely an approximation to such a supply. The chief impediments in the way of diseases, insects, &c., appear to be the following:

1. The crop is rather precarious, and some fruits bear only once in two years. In a good collection, however, there is always a supply of some fruit or other, even in the most adverse seasons, and meanwhile the trees are gathering strength.

2. Persons who own land, and ought to plant on it, say: "It is not worth while, for I may move away or rent, and in either of these cases I should receive no return for my outlay." This principle is generally acted upon, but it is none the less thankless, ungenerous, impolitic, and wrong.

3. Many who have planted more or less, say: "After raising an orchard, and caring for the trees through many years as for the 'apple of the eye,' when they at length begin to bear, the branches are broken and the fruit carried off by plunderers, whom the law calls but trespassers; or, what is worse, I am suddenly beset by swarms of idlers—summer friends—who take both my time and fruit, and leave me minus everything but the 'echo of their gentle voices.'" Perhaps there is no greater obstacle to the general culture of fruit than this. The owner of a finely laden tree feels a natural impulse to share its produce with his friends; but at the same time, he feels that his care, labor, time, and money, should give him the right to do with it as pleases himself; and when he finds this right unscrupulously and continually violated, his trees become a source of annoyance; and if he does not cut them down, he neglects them, and lets them go down themselves. Some

thing might be done to correct this by legislative enactments, but more, perhaps, by the formation of village horticultural clubs.

4. Every kind of fruit is affected more or less by insects and diseases, and none flourish without care and culture. This is true; and it is the price we must pay for everything most necessary to our existence. The following account includes all the principal difficulties of this kind that we encounter in this region.

Apples.—The trees suffer occasionally from large sawyer worms, which eat the roots; from the bark-louse, or scale insect, on the branches, and from woolly and green lice, or aphides, which check the growth at the top. Caterpillars and blight do but little injury. The borer and canker-worm are unknown here. The carpocapsa or apple-worm in the fruit, is often very abundant and injurious. But the cultivator himself is often much more destructive than any of these easily repelled insects, by suffering animals to browse the leaves from young trees, or by removing them himself during the season of growth, under an untimely and mistaken idea of the propriety of "trimming up;" by neglecting to form the heads of his trees when young, and inflicting the most violent amputations after the branches become large; and, worst of all, by crushing through and cutting off the roots with a plough during summer. He, himself, out-Herods all the insects that can be found.

Pears.—The blight has scarcely appeared for several years past. Trees on healthy stocks, once fairly established, grow well, and the fruitful varieties are very productive.

Peaches.—The "yellows" has destroyed a large proportion of the trees, and the "curled leaf" has seriously weakened and injured the remainder by causing the growth to be unnaturally late; in consequence of which, the wood does not mature nor bear the winter well. This affection is so universal from the Atlantic to the Pacific, and has appeared so regularly for three or four years past, that I think it cannot be attributed to peculiarity of weather. It seems as inscrutable as the "potato rot." It was less injurious last spring than previously. The peach-worm is as common as ever. The application of a mound of ashes around the base of the stem during summer, and an examination in autumn, is the simplest and surest method of at once manuring the tree and securing it against serious injury by the worm. Budded trees of the larger improved kinds do not bear so well as seedlings while young and in vigorous growth; but when of full size, they often bear too abundantly.

Plums.—The common damsons, &c., lose their leaves in summer, and suffer in consequence, even more than the peach, by "curled leaf." But the strong-growing, large-leaved sorts are exempt from this blight; their robust habit seems to be proof against it. The "black knots" have done no injury here, but the curculio is very destructive; less so, however, in 1852–53, than previously. I have succeeded perfectly in warding off the curculio for several years, by allowing pigs and poultry to run in the plum garden during May and June.

Cherries.—The common morello is nearly extirpated by the "black knot." All other kinds do perfectly well here on all dry soils, but

especially on slate, and have no disease but a liability of some sorts to rot, if much rain occurs when they are ripening.

Grapes.—These grow freely, and bear profusely. The Catawba does not ripen freely in our elevated valleys without the aid of a wall, unless in very dry and hot seasons. The only injury from insects is committed by a large caterpillar, which eats off the leaves to the great detriment of the fruit. The York Madeira, when fully ripe, is our best grape; at least, I think the majority say so. The Isabella, Catawba, Clinton, and Muscadel, are severally preferred by many.

APPLES.

That the common apple-tree is a native of the Eastern hemisphere, we have the authority of the earliest writers in "Holy Writ," as well as of the naturalists of ancient Greece and Rome. Apples are mentioned by Theophrastus, Herodotus, and Columella. The Greeks, according to Pliny, called them *Medica*, after the country where they were first brought, in ancient times; but others conjecture that the term "Medica" was more properly applied to the citron and the peach, both of which are supposed to have been introduced from Media into Greece. That the *Epirotica*, from Epirus, were what we call apples, there can be no doubt, as they are described by Pliny as a fruit with a tender skin, that can easily be pared off; and, besides, he mentions "crabs" and "wildings," as being smaller, "and for their harsh sourness they have many a foul word and shrewd curse given them." The cultivated apple, however, probably was not very abundant at Rome in his time, for he states that "there were some trees in the villas near the city, which yielded more profit than a small farm, and which brought about the invention of grafting." "There are apples," continues he, "that have ennobled the countries from which they came; and our best varieties will honor their first grafters forever; such as took their names from Matius, Cestius, Manlius, and Claudius." He particularizes the "quince apples," that came from a quince grafted upon an apple stock, which smelled like the quince, and were called *Appiana*, after Appius, of the house of Claudius. It must be confessed, however, that Pliny has related so many particulars as facts, concerning the apple, (such as changing the fruit to the color of blood, by grafting it on the mulberry; and the tree in the Tyburtines country, "grafted and laden with all manner of fruits," which are regarded by modern grafters as physiological impossibilities,) it would seem that very little confidence could be placed in his statements of any kind. But what reason have we to doubt the authority of a man whose life was spent to the benefit of mankind, and whose death was caused by his perseverance in search of truth? Instances of grafting trees of different families upon one another, are also mentioned by other old authors; and even our Evelyn, of more recent times, states that he saw in Holland a rose engrafted upon the orange. Columella, a practical

husbandman, who wrote some years before Pliny, describes three methods of grafting, as handed down to him, by whom he calls the "ancients," besides a fourth method of his own, and a mode of inarching, or grafting by approach, "whereby all sorts of grafts may be grafted upon all sorts of trees." It would appear, however, that the art of grafting, at the period in which he flourished, was comparatively a modern invention, as it is not mentioned by Moses in his directions to the Israelites, when they "* * * * * shall come into the land, and shall have planted all manner of trees;" neither by Hesiod nor Homer, although forming a part of the subjects on which they wrote.

The making of cider was introduced into Britain by the Normans, who, it is said, obtained the art from Spain, where it is no longer practised. This liquor is supposed to have been first known, however, in Africa, from its being mentioned by the two African fathers, Tertullian and Augustine, and was introduced by the Carthaginians into Biscay, a province unfriendly to the vine, on which account it became the substitute in other countries.

The introduction of the common apple-tree into the British North American colonies, dates back to the early periods of their settlements. The seeds of apples, and of various other products, were brought from England at the order of the "Governor and Company of Massachusetts Bay in New England," in 1629. On the 3d of April, 1632, Governor's island, in Boston harbor, was granted to Governor Winthrop, on condition that he should plant thereon a vineyard or an orchard. Apples were cultivated near Plymouth by the Pilgrims, soon after their arrival, and some of the original trees were standing there up to within a few years.

To Massachusetts we are indebted for the famous "Baldwin apple," so much esteemed for its good qualities and long keeping. It originated in Wilmington, near Boston, more than a century ago, in that part of the town now called Somerville, on the farm of a Mr. Butters, and was known for a time as the "Butters apple." As the tree was frequented and perforated by the woodpecker, it was also called the "woodpecker apple." Orchards were propagated freely from this tree eighty or more years ago, by Dr. Jabez Brown, of Wilmington, and by Col. Baldwin, of Woburn. By the sons of these latter gentlemen this fruit was brought into general notice, as the "Baldwin apple."

The first orchard planted in Rhode Island was at Study Hill, near Pawtucket, by Rev. William Blackstone, in 1636. It contained an apple by the name of the "yellow sweeting," famous in that day.

The apple was planted at Hartford, in Connecticut, previous to the year 1645. An ancient tree of the "Pearmain" variety is still standing on the Charter Oak place, in that city, which was brought from England, by George Wyllis, more than two hundred years ago.

The "Fisher apple" was brought to Portsmouth, in New Hampshire, by John Fisher, a merchant from London, in 17—. The original tree is still standing on the public farm of that city, in good bearing condition.

In 1741, apples were exported from New England to the West Indies, in considerable abundance. Prior to that period, one hundred hogsheads of cider were made from a single farm.

The common apple was grafted on wild crab stocks in Virginia, in 1647. The same year twenty butts of cider were made in that colony, by Richard Bennet.

A "Codling tree," sent from England about a century ago, by Charles Lord Baltimore to his son, Benedict Calvert, is now standing in full vigor at Mount Airy, Prince George's county, in Maryland.

The original "Newtown Pippin" tree is stated to have been the spontaneous production of a seed near a swamp in Newtown, Long Island, New York, more than a century and a half ago. It stood on the estate of Gershom Moore, and for a long time the fruit went by the name of the "Gershom Moore Pippin," so called in honor of its former proprietor. After enduring for more than one hundred years, this tree died, in about the year 1805, from excessive cutting and exhaustion. Its scions were in great request by all the principal amateurs and orchardists of the day, and engrafted trees of it are still to be met with in the neighboring towns, which have stood beyond the memory of man.

It appears, from Dodsley's London "Annual Register," that in the year 1768, the society for promoting arts, &c., at New York, awarded a premium of £10 to Thomas Young, of Oyster Bay, for the largest nursery of apple-trees, the number being 27,123.

The quantity and valuation of apples and vinegar, of domestic growth and manufacture, exported from the United States within the last thirty-three years, are indicated in the following table:

Years.	Apples.	Value.	Value of vinegar.	Years.	Apples.	Value.	Value of vinegar.
	Barrels.	Dollars.	Dollars.		Barrels.	Dollars.	Dollars.
1820–21	68,643	39,966	.....	1837–38	20,157	41,121	5,241
1821–22	63,689	48,499	.....	1838–39	23,470	50,875	3,745
1822–23	53,606	30,429	.....	1839–40	23,396	55,131	6,401
1823–24	27,055	46,813	.....	1840–41	25,216	48,396	12,957
1824–25	32,354	53,662	.....	1841–42	14,239	32,245	10,208
1825–26	15,695	27,370	5,801	1842–43	15,412	32,825	7,555
1826–27	30,648	35,828	8,182	1843–44	22,324	51,465	8,315
1827–28	13,839	22,700	5,884	1844–45	54,022	81,306	14,375
1828–29	8,193	15,958	5,953	1845–46	30,903	69,253	17,489
1829–30	14,458	23,727	6,690	1846–47	45,300	92,961	9,526
1830–31	16,375	31,148	7,178	1847–48	38,719	88,944	13,920
1831–32	6,928	15,314	4,677	1848–49	47,694	93,904	14,036
1832–33	17,075	33,262	3,347	1849–50	11,215	24,974	11,182
1833–34	25,276	41,849	3,805	1850–51	28,842	71,367	16,915
1834–35	9,745	20,959	4,540	1851–52	18,411	43,635	12,220
1835–36	22,235	39,668	3,634	1852–53	45,075	107,283	20,443
1836–37	20,594	40,990	4,313				

CONDENSED CORRESPONDENCE.

Statement of S. S. Boyd, *of Jacksonsburg, Wayne county, Indiana.*

Apples are the principal fruit cultivated in this county. They grow to great perfection, with but little attention after planting. The crop does not entirely fail oftener than once in five years. The cause of such failures is late spring frosts, which generally occur in May, after the apples are formed on the trees. I have now a collection of thirty-six varieties, mostly winter fruit; all of which are in good keeping, all obtained in this vicinity, and most of them valuable.

The best summer varieties cultivated here are the "Yellow June," "Sweet Bough," "Sour June," "Early Red," and "Summer Queen."

Of autumn apples, the best are the "Wine Apple," "Fall Pippin," "Rambo," and "Maiden's Blush."

The winter varieties are the "Vandervere Pippin," "Golden Russet," "Yellow Belle-fleur," "Cumberland Spice," "Smith's Cider," "Winesap," "Neverfail," "Rhode Island Greening," "Red Pearmain," "Romanite," and the "Butter Apple." Of all the varieties, none perhaps are such certain bearers as the "Neverfail" and "Vandervere Pippin."

The only disease to which apples are liable is the "black" or "bitter rot." No cause nor remedy is known. Rhode Island Greenings and Vandervere Pippins are most free from malady. The last season, however, was one of abundant and faultless fruit. Hundreds of bushels of apples rotted in the orchards, and few were sold, except to supply the demand in the towns and villages of this county. At the time of gathering, they sold from 20 to 25 cents per bushel.

In regard to keeping apples, I am satisfied from my experience that more apples rot from being kept too close and warm during the winter than all other causes combined. I have a cellar through which the air circulates freely, where potatoes cannot be kept during the winter on account of freezing. Apples only freeze when the mercury is below zero; yet mine have kept remarkably well every season, whilst those in warmer cellars in the vicinity have frequently been destroyed by rot. The cold winter of 1851–52 killed many of the apple-trees in this region. Those of the age of from ten to fifteen years after transplanting suffered more than any others.

Statement of Micajah Burnett, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Of apples, we have fifty varieties in bearing; and the greater part of them do well. The "Jennetting" is a most important variety. The tree grows with usual thrift, and is nearly three weeks later in blooming than all others we have made trial of, and thus escapes the late frosts in the spring. The following varieties succeed best with us:

Summer kinds.—Striped June, Early Harvest, Carolina June, Sum-

mer Rose, Royal Pearmain, American Summer Pearmain, and Gravenstein.

Autumn varieties.—Rambo, Queen, Fall Pippin, Golden Russet, Spitzenberg, and the Belle-fleur.

Winter varieties.—Jenneting, Pryor's Red, and the Limber Twig.

The last mentioned is valuable as a very late keeper. The Newtown Pippin is also an excellent winter apple when it does not "spot."

Statement of H. W. HUNTINGTON, *near Trinity parish, Catahoula, Louisiana.*

The apple, when in a position to be shaded fully half the day, I have found to yield richly; and I have gathered from my trees the variety of pippin called by Coxe the "Monstrous," weighing half an ounce over two pounds, highly flavored, and juicy at that. In situations exposed to the sun throughout the day, the trees shoot up much in the form of a Lombardy poplar, bearing a juiceless fruit, which generally falls in an immature state.

Statement of D. A. FAIRBANKS, *of Augusta, Kennebec county, Maine.*

An orchard belonging to this city, of about two hundred trees, produced this year 250 bushels of grafted apples, which sold for $2 50 per barrel. This orchard is well situated on a southeasterly slope, with a hill on the west to break off the cold winds, and is enclosed by a tight high fence. For quite a number of years it has been pastured with hogs, to enrich and keep light the soil, and to eat the small apples which fall from the trees. Last year the same orchard had some 600 or more bushels on it.

The varieties in this orchard, and which thrive well in this climate, are—for winter use, the Roxbury Russet, Nonsuch, Rhode Island Greening, Baldwin, Talman Sweet, Blue Pearmain, and the Esopus Spitzenberg; for fall use, the New York Russet, Franklin Sweet, and the Fairbanks; for summer use, Sops-of-Wine, Moses Wood, and Summer Sweet.

The cost of transporting fruit from this county to the Atlantic market by navigation is 10 cents a barrel; by railroad, 44 cents.

Statement of ABRAHAM PREBLE, *of Bowdoinham, Lincoln county, Maine.*

Apples, in this vicinity, are the principal fruit crop. Our climate seems well adapted to their growth, and when properly cultivated they pay well for our labor. Thirty years ago few of us knew anything about grafted fruit. There were large orchards of native seedlings, and the fruit of so little value that some farmers, considering their orchards an incumbrance to the land, cut down large portions of them; many others neglected their fruit-trees, and nearly all of us failed to set young trees. About twenty-five years ago, grafters came from the West and set some scions in nearly every town in this county. After their grafting came into bearing we soon saw the great superiority of grafted over ungrafted fruit; and it awakened an interest, which has

been yearly increasing, for pruning, cleaning, and grafting old orchards, and setting out young ones. But we met with a difficulty in the want of nurseries; for Western trees came so high, that most of us could not afford to buy many of them. But now fruit-trees come cheaper, and we have plenty of nurseries at home; so that the number of trees set annually is fast increasing.

Caterpillars have troubled our orchards more or less for many years; but a little care in season will destroy them in the nest. Borers, in some neighborhoods, have done mischief; but they may be destroyed while in the tree by thrusting a limber wire into their holes.

To make orchards productive, and yield fair fruit after being grafted, the land should be kept loose and rich, and the trees scraped and yearly pruned.

Varieties.—We have engrafted a large variety of apples, from those which ripen in August to those that will keep the year round. Among our best summer varieties are the August Sweet, Sops-of-Wine, and Jenneting. The Pound Sweet, Kennebec Seedling, and Low Graft, are fine for fall. The two most valuable cooking apples are the Cat Head and King's Pocket, both very large and productive bearers. I have raised Cat Heads sixty of which made a bushel. Our orchards have been extensively engrafted with winter apples, particularly those which keep longest; so that at present there is a greater supply of winter than summer or autumn varieties. Baldwins, Rhode Island Greenings, and Roxbury Russets are considered the most valuable for long keeping and shipping. The trees are good bearers, hardy, and make fine tops. The Blue Pearmain is a very fine apple in some locations, but generally with us neither trees nor fruit do well. The Black Giliflower is an early winter apple, much admired by some. The Black apple lately originated in South Paris, Oxford county, in this State, and is highly recommended, but not sufficiently tested. The Golden Ball is also a very fine large apple, (keeping until March,) which lately sprang from the orchard of Mrs. Paul Bayley, of Sidney, Kennebec county. The trees are hardy and thrifty, and make large, handsome tops; but we have not sufficiently tested their bearing qualities. New varieties are annually brought into notice.

Cost and profit of an apple orchard.—One hundred trees planted on an acre of land will cost, on an average, $25. The land should be kept in a state of cultivation whilst the trees are coming into bearing. About $25 expended in care and labor, besides the crops taken from the land, will bring them into a bearing state. When an acre of trees is in its prime it will average 400 bushels per annum, provided the land is kept rich and loose, and the trees well managed. Average price, 66 cents per bushel. Our surplus apples are valuable for all kinds of stock, particularly to winter store-hogs. Sweet apples are worth about as much as potatoes.

Nurseries.—My method of cultivating young trees is to sow pomace from the cider-mill in the fall, in drills two feet apart. The two following seasons I keep the ground clear of weeds. In the fall of the second year I dig up the young trees and pack them in the cellar, covering the roots with earth. In the month of March following, when I have little to do, I take them into a room, with heat enough to keep

comfortable, and graft them with the best varieties of fruit, bind and label each bundle with the name of the variety, and again pack the roots in earth in the cellar. When the stock is larger than the scion I split it in the middle, and cut the scion in the form of a wedge, inserting the scion in such a manner that the saps, wood, and bark come together on one side. I secure the scion by winding a few turns of twine around the stock to make it hug the scion; covering the wound with cement. When the stock and scion are of equal size, I adopt the whip-method of grafting.

As soon as the frost is out of the ground, make it rich with the best manures for corn; plough deep and fine; furrow four feet apart, two furrows in a row; and remove the trees from the cellar, keeping the roots from the sun as much as possible whilst transplanting. I place the trees 15 inches apart in the rows, bending the tap-roots in a horizontal position, and covering the other roots with fine earth about two inches deeper than they originally grew. As soon as I find the scions have taken, and have grown about two inches in length, which is generally about the last of June, I cut the twine by holding in my left hand a piece of wood with a notch cut in it to rest against the back of the tree to keep it steady; with a sharp-pointed knife in my right hand, with the edge upwards, I cut through the cement so as to cut off each turn of twine. If the twine is not cut, it will girdle and spoil the tree. Engrafted trees, managed in this way by a skilful hand, will do well; and more than seven-eighths of them will live and grow. Some of them will grow but little the first year; others, one, two, three, or four feet. The sprouts from the stock must be kept off, and when the scions are not inclined to shoot up, lash them to small stakes; otherwise they will be broken down. When mice are plenty, they will girdle and destroy the trees if something is not done to prevent them. To know each variety whilst in the nursery, I split stalks of cedar two inches wide, shave them smooth and paint them white, and then stick one where a variety begins and where it ends, and mark the names on them with black paint.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine.*

Although I am in the mercantile business, my favorite pursuit for many years has been to ascertain what choice fruits will best suit the climate of Maine, and more particularly the locality of Bangor and its vicinity; to introduce and disseminate such fruits as widely as possible on Penobscot river, and through the State. The reputation of many fruits will depend on their location. What may be strictly true of a fruit grown in Maine, may be as strictly false of the same variety if grown in Pennsylvania, or further south. In the one case, it may be first-rate; in the other, inferior in flavor. Therefore, in the selection of varieties, the pomologist should be influenced by the climate of his location. Our climate differs from that of England, yet it approaches nearer to it than most other States; for the fruits that best thrive in that country, grow in great perfection in Maine.

I know of no way that lands in this region can be used to so great a profit as by the cultivation of the finer varieties of fruits. No crops

command so high prices. For ten years past the average price in our market has been for apples $1 per bushel; for plums, the best varieties, $4 per bushel. For pears a still higher price. In this part of the State the demand is greater than the supply at these prices.

There is a lively interest awakened here on the subject, and we have in this city a flourishing horticultural society, which annually holds a highly respectable show of fruit; particularly of the apple, the pear, and the plum.

Grafting and budding.—There is annually, at the right season, much grafting and budding done. The grafting is not performed by splitting the stock, but by "saddle grafting," which is very popular here; for the trees grow perfectly sound at the junction, as the scions nearly all live and thrive when the grafting cloth is used. I here give the method that is adopted, which, as far as I can learn, is uniformly practised on this river. First, take six pounds of beeswax, one pound of rosin, and one pint of linseed oil, (no other than linseed oil should be used) and melt them well together over a slow fire. Then, while warm, with a paint-brush, spread the wax on one side of closely woven cotton cloth, which cut, when waxed, into strips as may be wanted, say half an inch wide and from nine to twelve inches long, according to the size of the stock to be grafted. I have used this grafting cloth with almost sure success for many years. It is very pliable, easily worked, and contains nothing that in the least injures the scion, or stock. No strings are necessary, and the work may be very neatly as well as quickly performed. These waxed strips may also be used in budding trees, also for covering wounds on trees. Some use more rosin than one to six pounds of beeswax; but rosin is not so pliable as beeswax, and the only reason I use any is for its adhesive quality. All stone fruits should be grafted very early in the spring. I have grafted plums and cherries with success when the snow was over a foot deep where the trees stood. It was in the month of March.

The Paradise stock is used for apples, though some engraft upon the Doucin stock. For dwarfing certain varieties of pears, the Angers quince is preferred for the purpose. For the cherry, the Mahaleb stock is employed. For plums, the Canada plum stock is mostly used; but it operates like the pear on the thorn or mountain ash—the scion outgrows the stock.

The cherry-tree should be grafted before the frost is out of the ground.

Pruning trees.—I think most people prune too much. The tap-root is cut off when the tree is planted, and all the branches, for at least six feet from the ground, and in some cases they are pruned so severely that a man on horseback could ride round them without touching his hat to the few limbs that are left. Thus the trees are treated with downright cruelty. The result is, the bodies of the trees are more or less affected with the "sun-scald." However we may respect the customs of our fathers and grandfathers, we are not obliged to copy their errors. To preserve the pear and other fruit-trees that have been deprived of their much needed dress and ornament, we wind the bodies with wreathes of hay, or shade them by cotton cloth from the ground upwards to the lower branches. Where this is done, in every instance it has afforded

a sure protection from sun-scalds. I have long been convinced of the great benefit of permitting all fruit-trees to branch near the ground, suffering them to form the shape of a pyramid. Mulching has been found very beneficial, more especially to newly planted trees. It is done by spreading refuse hay or straw, a few inches thick, over the roots of the trees.

Manuring trees.—In this and the other States of New England, where the lands are not rich, some of the farmers are in the habit of gathering fruit from their orchards, for a succession of years, without giving the soil any nutriment. In Maine, if we take heavy crops from the soil, we must enrich it in return, or it will soon be exhausted, and the fruit will surely deteriorate. With us, there is more danger of starving our fruit-trees, than of giving them too much food. I therefore see no good reason why we should manure our lands for crops of wheat, corn, and potatoes, and utterly neglect to enrich the soil for our crops of fruits. One of our farmers was asked why his apples were so much superior to those of the same variety raised by his neighbor? "Because," he replied, "I fat my apples by enriching the soil around the roots of my trees." There was good sense in the reply. These observations would not be called for, if we all had soils like the rich prairies of the West. We have in this State ample means to fertilize our soil, for growing fruits, by swamp or pond muck, in any quantity desired—lime, ashes, bones, and other fertilizers.

Under-draining land is beginning to attract attention; and so far as it is practised, it has in every instance been attended with great success. Perhaps it is more beneficial here than in other soils. Dwarfing fruit-trees has become fashionable, more especially in cities.

With us, the apple is the most useful of fruits. Its value is greatly enhanced by its long-keeping qualities. When the cultivator plants trees of varieties that will ripen in succession, he has this fruit in perfection the whole year. It is not only valuable for the dessert, but for culinary purposes, even in a dried state. Sweet apples are a wholesome food, and should be cultivated more extensively. I think that our farmers would find it much to their advantage if they would cultivate a greater proportion of sweet apples, for culinary purposes, as well as for feeding to stock.

Apples grown in this State are kept full a month longer than those raised in most of the other sections of the country. I therefore believe that Maine will, at no distant day, become one of the largest exporting fruit States in the Union. Immense quantities are commonly exported to foreign countries in ships owned here, which affords us every facility of adding to the cargoes our long-keeping apples. In this respect we have many advantages over our brethren of other States, which have less seacoast, and, with two exceptions, less navigation. Maine is indented along the seacoast with more than three hundred harbors, suitable for ships, steamers, and other vessels.

The varieties cultivated with the best success, in this section, are as follows:

Summer apples.—Bell's Early, or Sops-of-Wine; Drap d'Or; Early Harvest; Early Sweet Bough; Red Astrachan; Tetofsky; William's Favorite.

Autumn apples.—Beauty of Kent; Dutchess of Oldenburg; Fameuse; Gravenstein; Garden Sweet; Jewett's Red; Maiden's Blush; Norton's Melon; Orange, or Golden Sweet; Porter; St. Lawrence and Hawley (promise well.)

Winter apples.—American Golden Russet; Baldwin; Blue Pearmain; Danon's Winter Sweet; Domino; Golden Ball; Hubbardston Nonsuch; Jonáthan; Lady's Sweeting; Minister; Mother; Northern Spy; Peck's Pleasant; Pomme Gris; Rhode Island Greening; Ribstone Pippin; Roxbury Russet; Tallman Sweet; Vandervere; Wagener (not fully tested.)

Our horticultural exhibition is annually held about the 20th of September. Every year there are sound apples of the previous year found on the tables. At the exhibition of fruits in 1852, a plate of sound apples were on the tables which were grown in 1850!

I will here remark, that where there is one apple-tree now growing in this State, there should be one hundred or more. When we have a surplus of apples, we can export them to Europe, and other parts where the apple is not grown in that perfection that it is with us, and where they command a price varying from $7 to $20 per barrel.

Ribstone Pippin.—This variety is only second-rate in Pennsylvania and other States south of New York. Here, as in England, it is generally considered our best winter apple. Hon. Ephraim Goodale, of Orrington, near this city, now eighty years of age, has cultivated it for fifty years, and his opinion of fruits has great weight with the public here. He thinks it has no superior for the climate of Maine. He received this variety, and the Sops-of-Wine, under the name of Bell's Early, by which it is known here, from the Hon. Dr. Vaughn, of Hallowell, who brought them from England. I have seen the Ribstone Pippin in great perfection in the gardens of Montreal. In 1850, Mr. Sharp, of Woodstock, New Brunswick, wrote to me for a selection of apple scions, suitable for the cold climate of that province. I accordingly sent him 1,000. He has lately written me that he has growing on his farm 28,000 apple-trees of the varieties I sent him—2,800 of which were of the Ribstone Pippin; 800 of the Rhode Island Greening; 700 of the Gravenstein; 650 of William's Favorite; 600 of the Red Astrachan; 500 each of the Dutchess of Oldenburg, Fameuse, Bell's Early, Northern Spy, and others. The Ribstone Pippin is peculiarly suited for a northern climate.

Maiden's Blush.—I never have seen this variety so beautiful in color nor so rich in flavor as those grown on the Penobscot.

Bell's Early, or Sops-of-Wine.—This has been for fifty years the favorite early apple of Bangor and its vicinity. When grown here, it is a first-rate fruit. It requires a rich soil. This variety and William's Favorite bring high prices in this market. I may here remark, that here and elsewhere a deep red apple is more saleable than any other colored one.

The *Dutchess of Oldenburg* was first brought here in 1847. One of the trees bore a dozen of handsome apples the same year. The tree and fruit on it sold for $4; since which time the variety has been extensively cultivated. It proves very productive; the trees bear young, and are fast growers.

Gravénstein.—This is deservedly the most popular autumn apple in this part of Maine. It was introduced here in 1828, and the first tree grafted with this variety, bore 20 bushels the twelfth year, and has since bore, in good fruit years, 25 bushels. It is extensively cultivated in this region, and the trees are fast growers.

Vandervere.—This variety was also brought here in 1828. It requires a rich, light soil. It is one of our best and handsomest winter apples.

Hubbardston Nonsuch.—This fruit has been cultivated on this river nearly fifty years. It sustains the highest reputation, and is one of the handsomest and finest flavored fruits in the catalogue of apples. It is not yet cultivated so extensively as the Ribstone Pippin in this vicinity.

Rhode Island Greening.—This apple cannot be dispensed with, as an old and very reliable acquaintance—a great and sure bearer.

Baldwin.—No apple is so extensively cultivated in Massachusetts as this. It is very partial to the place of its nativity, in Middlesex county in that State, where it grows in great perfection. When it was first brought to the Penobscot, it was hardly worth cultivation; but it grew better from year to year, both in flavor and color, until it is now classed among our best apples.

Northern Spy.—Thousands of trees are planted of this new variety, some of which have fruited. It requires high cultivation, and the trees are very thrifty. The specimens of fruit that I have seen are not equal to those grown in New York—they are variable. We have not cultivated it long enough to form a correct opinion of it.

William's Favorite.—No early apple commands a higher price than this in our market. Its size, color, and great beauty, also its mild subacid, rich flavor, combine to make it very popular.

Early Sweet Bough.—This variety is beginning to be extensively cultivated here, and, I believe, is generally considered the best early sweet apple. The trees are very thrifty and productive.

The foregoing apples are selected from the large number of varieties cultivated in this region. Were I to make a selection for Pennsylvania, Ohio, or other distant States, I could point out other varieties equal to, or superior to those cultivated with us. For instance, in New York, I could name the far-famed Newtown Pippin, the Esopus Spitzenberg, the Swaar, the Fall Pippin, and the Ounce apple, which do not grow here to that perfection they do in their native State.

Statement of Simon T. Ashton and Elijah Myrick, *Trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

We have an orchard of one hundred varieties of the apple, selected from the best nurseries. These are just beginning to bear, most of them giving promise to be equal to the recommendations of the best authorities, and agree well with the descriptions, as far as we have had opportunity to compare. They have not, as yet, been in bearing long enough for us to speak advisedly of their comparative or respective merits. In our older orchards we have some thirty other kinds of good apples.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

Apples in this county are a profitable crop. They sell at from 25 to 50 cents per bushel, and are carried in considerable quantities to Detroit, and shipped to Chicago and other ports on the lakes. The cost of transportation from Detroit to New York is from 75 cents to $1 per barrel.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

This is emphatically the land of the apple. Every variety of fruit seems to flourish on this soil. Peaches succeed well, failing about once in four or five years. Plums generally bear well. The pear and cherry (except the morello) rarely succeed.

Statement of SAMUEL WEBBER, *of Charlestown, Sullivan county, New Hampshire.*

Apples are the only fruit cultivated here in sufficient abundance to be a regular article of sale. Good grafted varieties, in years of fair yield, have usually sold at about 50 cents a bushel; cider apples, at from 12½ to 17 cents; good cooking apples, from 20 to 34 cents per bushel The present season, the apple crop has almost entirely failed in this vicinity, and good fruit has sold for 70 to 75 cents per bushel.

Statement of F. W. LAY, *of Green, Monroe county, New York.*

Formerly, fruit was considered of little value in this county. Could the farmer raise sufficient for the consumption of his family, and annually make a few barrels of cider, it was all he wished or expected. Most of the early orchards were natural fruit, and from these have originated some of the best and most popular sorts; but latterly these trees have most of them been top-grafted with approved varieties; and railroads and canals have opened such a market with the Eastern cities, that no branch of business that we can pursue is so profitable as this. One dealer in this town has bought and shipped East, the present season, some 18,000 barrels of apples, at a cost of about $1 50 per barrel.

Probably, in no section of country in the world is there such interest in the cultivation of fruit as in the county of Monroe. Almost every farmer is planting out large orchards of apple, peach, and plum, while the extensive nurseries of Rochester and vicinity are continually pouring out their thousands of trees. There is such an increase in this business, that the questions are often asked: Can it remain profitable? Will not the market be glutted? I think not; for we have always found that as the business increases, new markets are opened, and more fruit is used. The nurseries of this county occupy several hundred acres of closely planted trees. The business is one of the best the farmer can engage in.

Statement of ROBERT L. PELL, *of the city and county of New York.*

The orchard on "Pelham Farm," in Esopus, Ulster county, contains 20,000 bearing Newtown Pippin trees, twenty-four years old. The fruit, by peculiar management in applying fertilizers to the trees, is produced in abundance every year, instead of every alternate year, as is usually the case. It is all picked by hand, sweated, and assorted into three qualities for market. The first quality is sold in New York for $6, and in Europe for from $12 to $30 per barrel. The second quality is also sold in New York for $4, and in the West Indies for $9 per barrel. The third quality is made into cider, which is refined on the estate, and is sold in New York at $4 per dozen bottles, or $44 per barrel. The pomace is placed under pressure after the first quality of the juice has been expressed, and the liquor, after being fermented and refined, is converted into vinegar, which readily sells in New York for 12½ cents per gallon, or $4 per barrel.

There are likewise on "Pelham Farm" one hundred varieties of choice apples, selected from all parts of Europe and America; forty-five varieties of hot-house grapes, six natives; thirty of peaches; thirty of plums; twenty of cherries; sixty of pears; ten of apricots; and ten of nectarines.

Some of these sorts were selected, first by purchasing all the varieties of the different nurserymen, planting them in the orchard or hot-house, and waiting until they bore fruit; then choice was made of the best.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Apples are cultivated in Central New York in large and increasing quantities, for the eastern market. They are delivered on the canal or railroad in barrels, by the wholesale dealer, at from $1 12½ to $1 37½ per barrel, the price varying with the quality of the fruit, the season, and the demand abroad and along the sea-board. The pippins, Rhode Island Greening, Seek-no-further, Pound Sweeting, Swaar, Spitzenberg, &c., are freely cultivated. The Baldwin, Bell-flower, and other fine sorts, are beginning to be cultivated. The season is scarcely long enough for the Newtown Pippin. A variety of long-keeping russets is also cultivated for home-market, which may be found on the stands in July. Our apple-trees are rarely injured by the winter or late spring frosts; nor do any of those insects which ravage the orchards in the Eastern States, invade them here, except the caterpillar. This insect, however, is a feeble enemy. The most economical mode of its destruction is to crush it with the naked hand as soon as a small web is seen. When, by oversight, it has acquired nearly its full size, the same prime instrument of nature is still best used to gather it into baskets or pails, after which they may be crushed by the foot on some hard and bare spot of earth. The mode of destroying these insects by hunting the nests in a clear and bright day in early spring, is neither so economical in point of time, nor so thorough in practice, as that above recommended.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Grafting.—In grafting, the first thing to be considered is the proper time for cutting scions, which may be done at any time after the leaves have fallen in autumn, until the buds begin to expand in the spring. If it is necessary to cut them any length of time before you wish to set them, they should be buried in damp sand, saw-dust, or something of the kind, to keep them moist. When the trees are in the neighborhood, I do not cut the scions until the day that I am ready to set them. The next thing to be considered is the proper scions to cut, which should be fine, thrifty, straight-grown shoots of the last year's growth. The buds upon the last year's growth will grow young shoots, while those upon the second year's growth are blossom buds, and will not make twigs. The proper size of the scions will depend very much upon the size of the stocks to be grafted. If they are small seedlings—say half an inch in diameter, or less—you should cut the scions that are from one-eighth to one-fourth of an inch in diameter. For stocks that are from five-eighths up to one and a half inches in diameter, you should cut scions that are from one-fourth to three-eighths of an inch. The ends of the scions, where they get below these sizes, it is best not to use, for they are unsuitable to take the sap from the stocks, and seldom, if ever, live. March is the proper time to graft plums and cherries, and April for all other fruits. They may live, indeed, if they are grafted as late as May; but they will not make so fine a growth the first year, and, consequently, will be less able to withstand the scorching suns of mid-summer. When you are ready to set your grafts, cut your scions up into grafts about three and a half inches in length. For cutting and preparing grafts, use a keen-edged knife. To prepare a graft for setting, hold the scion in your left hand, and your knife in your right; place the blade upon the scion about one and a half inches from its lower end, which should be held towards you; then draw it in a straight line, smooth and level, to the centre of the lower end. Then turn up the other side of the scion in your hand, and cut it in precisely the same manner. One and a half inches of the lower end of the scion will then present the form of a flat wedge. Its upper part should have upon it two or three good buds.

The stocks to be grafted are next to be considered. In grafting young trees from three to four feet high, they may as well be inserted about a foot above the ground. Trees that are five or six feet in height are generally grafted about three feet from the ground. In grafting large bearing trees, select from twenty-five to thirty of the most thrifty, straight, smooth-barked limbs from different parts of the top. Those which are about one or one and a half inches in diameter are to be preferred. At the point where you wish to insert the scion find a clear place, free from limbs, bruises, or curls; then, with a fine, sharp saw cut it off, leaving it square and level on the top; next, with your knife dress off the edge of the bark, which will be a little rough from the saw. Then take your splitting-knife, which should be very sharp, (a common butcher's knife is a tolerable substitute,) and split the stock carefully down the centre. In doing this, be careful to divide the bark even and clean as you go, so that the edge of the bark on the wedge-like end of your

scion will dove-tail into it and make a nice, close joint. It will be necessary to split in this way the stock one and a half inches, to correspond with the length you have the end of the scion. After making the split in the stock, and withdrawing the knife, you will need a little wedge made of hard wood, to crowd down the centre of the split and hold it open. Then put your scion into the split, and let the wood on the outer edge of the scion set even with the wood on the split edge of the stock; or, in other words, set the wood of the scion just within the wood of the stock, for then the bark on the scion will meet the edge of the bark on the stock. Next press the scion down firmly into the stock, and be very careful in the whole operation not to bruise the edges of the bark that meet between the scion and the stock. Then withdraw the wedge, and apply the grafting-salve, spreading a coat of it about one-eighth of an inch in thickness over the end of the stock where it was sawed off. Fit it down nice and tight over the edges of the bark and around the scions; then spread a strip down each side, over the split in the stock, so that the whole operation will be closed air-tight. This is necessary to prevent the sap from drying out and killing the scions. After the grafts are set, they should be looked to occasionally, as crevices will sometimes open between the bark and the salve and let in the air. The best salve is made by melting one pound of beeswax with six pounds of rosin in a pint of linseed oil.

Statement of LUTHER BAILY, *of the United Society of Shakers, North Union, Cuyahoga county, Ohio.*

Increased attention is paid to the cultivation of fruit with us. Among the best varieties of apples, and those that appear to be best adapted to our soil and climate, are the Richfield Nonsuch, Baldwin, Seek-no-further, Esopus Spitzenberg, Rhode Island Greening, Golden Pippin, Swaar, and Egg-top. Present price of apples, $1 per bushel.

Statement of JACOB KNOOP, *of Elizabeth, Miami county, Ohio.*

Much interest has lately been bestowed here in the cultivation of apples; and the choice varieties of the East have been introduced with good success. The specimens exhibited at our county fair cannot be excelled in any part of the Union.

The price of apples is from 25 to 50 cents per bushel. A considerable quantity is shipped to the South.

Statement of P. W. GILLETT, *of Astoria, Clatsop county, Oregon.*

Fruit-growing, the most pleasant, as well as the most profitable, branch of agriculture, is receiving increased attention with us. Indeed, no expense nor pains has been spared in introducing and testing varieties. Oregon has now a splendid assortment of fruit, with a climate congenial to its growth. The summers are too cool, however, at the mouth of the Columbia, to produce peaches of a fine flavor; but the interior of the Territory has a climate adapted to the perfect development of the finest peaches, pears, and grapes.

Green apples are worth from $8 to $10 per bushel, and ready sale at that. At this rate one acre of land in apple-trees, allowing 14 bushels to the tree, which is a low estimate for trees of mature age, and forty trees to the acre, gives the enormous sum of $4,480 per acre. This is a matter of fact, and not speculation. It is true, our orchards, being young, yield but from one to eight or ten bushels to the tree; but it is the opinion of some of our wisest men that good winter apples will command, in San Francisco market, as high a price for the next thirty years.

Statement of H. J. Beyerle, *of Sugar Valley, Clinton county, Pennsylvania.*

Our valley is subject to early frosts, which often prove injurious to the fruit culture. Some few fruit-growers have practised a mode of preventing frost which I never saw in print, and which I look upon as being quite effective: they smoke their orchards by building fires among the trees. The reader will bear in mind that low valleys or plains suffer more from frost than high ones; and, further, that frosts never occur where wind is blowing, nor where the atmosphere is cloudy, but only on mornings when the air is calm and the sky clear. On such mornings smoke always moves sluggishly, and frequently settles at a height but little above orchard trees. By making fires in different parts of the orchard a short time before daylight, the smoke, in a measure, will cover the trees, and thus prevent frost upon the same principle as fog or clouds.

Statement of John Eichar, *of Greensburgh, Westmoreland county, Pennsylvania.*

Of apples, we have the Newtown Pippin, which stands unrivalled for late winter use. This variety commands a higher price in the English markets than any other. The Rambo is also an excellent fall and early winter apple. Besides these, we have the Pennock, Maiden's Blush, York, Golden Gate, and the Marietta Russet.

Statement of Raleigh W. Dyer, *of Prillaman's, Franklin county, Virginia.*

In this county we have apples, pears, cherries, damsons, currants, prunes, and quinces. They all do well except pears, which fail from the blight. There is not a farm among us but has its orchard, though the fruit heretofore has been of a poor and insipid quality. Our farmers are beginning to turn their attention to this subject, and within the last few years there has been a very perceptible change, both as to quality and quantity. The best fruit-trees and scions are now being sought after by our farmers with avidity. We have not, as yet, sent much fruit to market, owing to the distance we have to transport it; yet I doubt not that this section of Virginia will, in a few years, produce vast quantities for market. The most common disease of apples seems, also, to be the blight; which I think could be prevented by ma-

nuring and stirring the land about the trees, thereby destroying the larvæ of insects about their roots, and killing the caterpillar. The kinds in use are the Pearmain, the Yellow and Green Pippins, the June, Horse, John, Buckingham, Limber Twig, Long Stem, Sweeting, Queen, Turner Red, Cannon, and Rusty Coat.

As regards the best mode of improving orchard lands, we are, it seems, at great fault; though we all know that something must be done. I have become fully convinced that our stables, barn and stock-yards, (although valuable as far as they go,) do not and cannot be made to afford a sufficiency of manure, and that the farmer who depends upon this resource alone, so far from improving his lands, will find them giving way and lessening in value from year to year.

Statement of EDWARD ALMOND, *of Mountain View, Page county, Virginia.*

More attention is paid here to fruit than formerly. Apples are the principal crop, and, I think, very profitable to the farmer. Yellow and Green Pippins, Rawl's Jenneting, Milams, and Long Keepers, are most suitable for winter use and exportation. I have raised the Mammoth Pippin to weigh 1¾ pounds and measure 16 inches in circumference.

I plant the trees 40 feet apart, with the holes sufficiently large, so as not to cramp the roots. I mix about two shovelfuls of manure with the soil, and plant them two inches deeper than they grew in the nursery.

Statement of H. R. ROBEY, *near Fredericksburg, Spotsylvania county, Virginia.*

I have found very few kinds of apples originating north of Maryland which would keep well through the winter, when grown here. For fourteen years I have paid great attention to their cultivation, and have collected a great number of Southern apples that have proved to be good bearers as well as keepers, and the best table fruit. My present crop of winter apples is small, owing to the fact that all the orchards were formerly planted with Northern trees; and, with few exceptions, ripen in the fall and early winter. For instance, the Belle-fleur, a fine winter apple in Pennsylvania, ripens here in September and October.

The following list of Southern winter apples, nearly all from Virginia, can be classed among the best:

"Abram," of medium size, striped, and a sure bearer; "Beverley's Red," rather large and very good; "Waugh's Crab," large, yellow, and russet; "Rawl's Jenneting," rather large, rich, juicy, and good; "Limbertwig," medium, dull red, great and sure bearer; "Leathercoat," medium, good bearer, quality moderate; "Milam," dark red, good; "Brooke's Pippin," large, yellow, good bearer, and keeps the best; "Ogleby," large pippin-shape, best; "Prior's Red," rather large and good; "Strawn's Seedling," large, striped, very good; "Belle Pree," large, yellow, ripe in early winter; "Winter Cheese," medium

very rich, juicy and good; "Wellford," medium, yellow, very good; "Vandervere," medium, dull red, very good; quite different from the Northern Vandervere; "Hall's Red," medium, great bearer, one of the best; "Bonum," large, very good; "Wine-Sap," medium, dull red, good keeper.

The following kinds of Northern origin promise well: "Baldwin," on limed soil, early winter, good; "Danvers Winter Sweet," very good, keeps well; "Esopus Spitzenberg," variable on young trees; "Northern Spy," very promising; "Pearmain, Herefordshire," keeps well; "Long Island Russet," very promising; "Rhode Island Greening," very good; "Swaar," very good.

The apple-tree here is much healthier when trained with low heads, the lower branches pruned to protect the trunk from the sun. When young trees are mulched thickly with straw, corn-cobs, or any trash, say three feet wide around each tree, they suffer very little from drought. There are a great number of Virginia apples, which are scarcely known out of the State, that cannot be surpassed.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

The raising of fruit-trees begins to attract considerable attention. My own experience induces me to say that apple, pear, plum, and cherry trees, will do well here. I have some apple-trees twelve years old from the seed, which produced last fall from two to three bushels of fruit each, some of them equal to good grafted kinds. Apple-trees, with common care, are remarkably thrifty and vigorous here. I think that an orchard ought to be ploughed every year, the land manured, and some low hoed crop cultivated between the trees, such as beans or potatoes, so as to keep the soil clean and mellow. If the land is kept in grass, which I consider unadvisable, it should be enriched and spaded at least once a year all round the trees about five feet distant or 10 feet in diameter, and kept free from grass and weeds, which is as expensive, and far less beneficial, than to plough the whole land.

Many farmers have set out orchards here within the last three years; but a number of them have done it in a careless manner, some digging small holes in grass land, putting in their trees, and afterwards leaving them to take care of themselves, or to the tender mercies of their cattle, which have given them the only pruning they ever received since planting. This course is wrong and injudicious, and must result in loss. Probably more than one-half of the trees thus treated have perished, and the remainder exhibit a sickly, stunted growth, the original tree frequently dying, and a bush of young shoots starting up from the roots, to be again browsed down the next season.

Fruit commands here a great price. I have sold all the apples I could spare, a majority of them natural fruit, for $1 50 per bushel, and could have disposed of hundreds of bushels at that price. It is probable that apples will not fall in price below 75 cents per bushel for at least six years; and when they fall to low prices, we will still have an extensive market for many more years in the Wolf river country and the Northwest, where fruit-raising must be much more uncertain than here.

Statement of J. A. CARPENTER, *of Waukesha, Waukesha county, Wisconsin.*

To prevent the depredations of gophers, ground-squirrels, cotton-tailed rabbits, and field-mice in our orchards, we protect the lower parts of the trunks of the trees by winding strips of old cloth or rye-straw around them to the height of 2½ feet above the ground, heaping up a cone of earth a foot high at the roots. Some tie around the trunks corn-stalks, laths, or barrel-staves, to save the trees.

Statement of JAMES H. WATTS, *of Rochester, Monroe county, New York.*

Rochester is celebrated for the growth of nursery trees, both fruit and ornamental. One thousand acres of land, if not more, are occupied by our nurserymen in the culture of trees in this vicinity, and they are sold to go as far as California, Oregon, and every part of our vast country. Some of the best fruits extant, both of apples and pears, have had their origin in Western New York, among which I would instance the following:

Northern Spy, Norton's Melon, and Early Joe, Ontario county; Wagener, Yates county; Baily Sweeting, Livingston county.

The Hawley, or Dowse, originated at Canaan, and is one of the best September apples; and, for a sweet one, I have never seen one superior to the Baily, which is a large, beautiful red apple, ripe from the 1st of November to December. It has the most saccharine matter in its composition of any apple I know of.

PEARS.

The common pear-tree is indigenous to Europe, Western Asia, the Himalayas, and to China; but not to Africa nor America. It is found wild in most of the counties of Britain, as far north as Forfarshire; on the Continent of Europe, from Sweden to the Mediterranean; and in Asia, as far east as China and Japan. It was the opinion of Loudon, however, that all the wild pears growing in England originated from the seeds of the cultivated sorts, accidentally disseminated by birds. In a wild state, it is always found on a dry soil, and more frequently on plains than on hills or mountains; and solitary, or in small groups, rather than in woods and forests. The varieties cultivated for their fruit succeed both in the temperate and transition zones of the two hemispheres; and it has been remarked that this tree, as well as the apple and the cherry, will grow in the open air wherever the oak will thrive.

The earliest writers mention the pear as growing abundantly in Syria, Egypt, and Greece; and it appears to have been brought into Italy from these places about the time that Scylla made himself master

of the last named country, although there is but little doubt that the Romans had several kinds of this fruit long before that time. Among the trees which Homer describes as forming the orchard of Laertes, the father of Ulysses, we find the pear. Theophrastus speaks of the productiveness of old pear-trees; and Virgil mentions some pears which he received from Cato. Pliny describes the varieties in cultivation, in his time, as being exceedingly numerous, and says that a fermented liquor was made of the expressed juice. "Both apples and pears," he says, "have the properties of wine, on which account the physicians are careful how they give them to their patients; but when sodden in wine and water, they are esteemed as wholesome." Again, he observes: "All pears, whatsoever, are but a heavy meat, even to those in good health, and the sick are debarred from eating them; and yet, if they are well boiled or baked, they are exceedingly pleasant, and moderately wholesome; when sodden or baked with honey, they agree with the stomach." According to Pownell, the cultivated pear was imported into Marseilles by the Phocæan colonists, some 600 years B. C.; and Whitaker thinks that it was introduced into Britain by the Romans; but at what period, although it is mentioned by all the early writers of that country, we have no account.

The introduction of the pear into the British North American colonies, dates back to the early periods of their settlements. The seeds were introduced by the "Governor and Company of the Massachusetts Bay in New England," in 1629. From these seeds, doubtless, sprung the venerable old pear-tree, still in existence, in the garden first owned by Governor Endicott, in Salem.

Another aged tree is still standing, in bearing condition, at the corner of the Third avenue and Thirteenth street, in the city of New York, which is stated to have been planted in the year 1646, by Peter Stuyvesant, then governor of New Netherland.

The pear was also introduced at "Peach Blossom Plantation," at Easton, Talbot county, in Maryland, in about the year 1730. The seeds were sent from England by Peter Collinson, a Quaker and a linendraper, of London, to his friend and former associate, George Robbins, then the proprietor of that plantation. Trees produced from those seeds are now found growing there in full vigor. Collinson, it may be remarked, was a great lover of animated nature and rural economy in every form. In a letter to Sir James Edward Smith, he declares that "every living thing called forth his affections." Among the numerous benefits he conferred upon the world, he introduced into England, and distributed in other countries, a great variety of the seeds of useful trees and plants, and otherwise contributed largely to the advancement of natural history, as well as to agriculture. His attention was early directed to the practicability of establishing "sheep walks" in Carolina and Georgia, after the plan of the migrating sheep in Spain; that is, in pasturing them on the mountains in summer, and transporting them to the lower country in winter.

The pear-tree was formerly cultivated to a considerable extent in this country, particularly in New England and Virginia, for making perry; but, at present, very little is manufactured, except on the banks of the Piscataqua and Salmon Falls rivers, in Maine.

CONDENSED CORRESPONDENCE.

Statement of S. S. Boyd, *of Jacksonsburg, Wayne county, Indiana.*

Pears, with us, have thus far been but an unprofitable fruit. The trees are subject to the blight, and hence do not attain a great age. The spring frosts also are fatal to the early-blooming pear-tree in this region.

Statement of Micajah Burnett, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

We cultivate the pear in this county to some extent; but, owing to some unknown cause, our trees have been almost free from blight for the last fourteen years. The Dentrick, Bartlett, White Doyenné, Seckel, and the Louise Bonne de Jersey, are the most valuable varieties we have in bearing.

Statement of Abraham Preble, *of Bowdoinham, Lincoln county, Maine.*

But little attention has been paid here to the cultivation of this fruit till quite lately. During the last and the present year, several persons have purchased foreign pear-trees, mostly worked on quince stocks, which are now on trial. From what I have seen of the few old trees among us, I think they will do well.

I have about twenty standard trees grafted on pear stocks, nine years from the seed and seven from the gratt, which are very thrifty, and apparently hardy. They have borne some very fine specimens the first two seasons; among which is the Fulton pear, which originated in Daniel Fulton's orchard, in this town. It is an October pear, hardy, and an enormous bearer, very rich, and not large. The French winter pear, weighing nine ounces, and the Bartlett, seven ounces, do well.

Statement of Henry Little, *of Bangor, Penobscot county, Maine.*

The varieties of pears cultivated with the best success in this section, are as follows:

Bartlett, on quince or pear stocks.
Beurré d'Amanlis, on quince.
Beurré d'Anjou, on quince.
Beurré d'Aremberg, on pear stocks.
Beurré Bosc, on pear stocks.
Belle Lucrative, on quince stocks.
Dutchess d'Angoulême, on quince.
Doyenné d'été, on quince or pear.
Dunmore, on pear.
Fulton, on pear.
Flemish Beauty, on pear or quince.

Glout Morceau, on quince.
Golden Beurré of Bilboa, on pear.
Louise Bonne de Jersey, on quince.
M'Laughlin, on pear.
Napoleon, on quince.
Passe Colmar, on quince.
Seckel, on pear, grafted high up the tree.
St. Ghislain, on pear.
St. Michael or White Doyenné, on quince.
Tyson, on pear.
Urbaniste, on quince.
Vicar of Winkfield, on quince.
Rostiezer, on pear.
Winter Nelis, on quince.

Bartlett.—No pear is so universally popular with the multitude as this. If pear-trees are found in any garden in New England, one or more Bartletts are sure to be among them. In this I admire their taste, and I go with the mass. It is a first-rate fruit on the pear, quince, and the mountain ash. It is a fast grower and a sure bearer.

Louise Bonne de Jersey.—This also is a great favorite with the public, and deservedly so. It is beginning to be extensively cultivated, and is decidedly better on the quince than on the pear. Flavor first rate.

Flemish Beauty.—This fruit is rightly named. No pear is more thrifty than this, either on the pear or quince. It is very productive, and unites as many good qualities as any other pear. It is extensively cultivated.

Vicar of Winkfield.—This is not a first-rate table fruit, yet it is one of the most productive of pears on the quince. It is reliable, the fruit large and fair, and we are sure of a bountiful crop of saleable fruit. This variety is generally found in every fruit garden.

Beurré d'Amanlis.—This is also a prodigious bearer and grower on the quince. It is hardy in this climate, the fruit large, and the quality very good.

Doyenné d'été.—This is a new early pear of the best quality. It sustains a high reputation, and is a great and early bearer, on the pear or the quince.

Statement of Simon T. Asheton *and* Elijah Myrick, *trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

We have had great difficulty in making the pear-tree grow on our clayey soil. After persevering and experimenting fifteen years at least, we have discovered a specific. We tried all the special manures our experiments or reading suggested, until, observing the effect of urine on an unthrifty apple-tree, we were induced to try it on some pear-trees which were unthrifty in spite of iron, ashes, lime, bone-black, and high manuring. The result was, that the trees shot up a growth as luxuriant as weeds in a hot-bed. Those which had rarely made an inch of growth in a season, grew scions from 18 inches to 3 feet even, in the summer following the application. The mode of treatment should be

as follows: The trees should be well and carefully set out, the soil made good by the application of iron, lime, or leached ashes. As soon as the buds are fairly opened, take of urine from the water-closet about two quarts and sprinkle it around each tree; stir the surface of the earth a little, so that it may be well mixed, and also to prevent the forming of a crust by rapid evaporation. A cloudy day is the best time for this operation, as it retards the escape of the volatile salts. In about a month, another application may be made in the same way. After this, it is only necessary to repeat the operation on those trees which may not have yielded satisfactorily to the first treatment. Care should be used not to over-stimulate, as this, of course, would be dangerous.

Our pear orchard consists of one hundred and twenty trees and fifteen varieties, the earliest and latest included. They are all treated in this manner, and the result is all the success that could be wished, and more than was even hoped for. The full effect of this form of ammonia is not to be seen the first season after setting.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Pears are cultivated here in considerable quantities, but with much less certainty and cheapness than apples. The adaptation of soil, climate, and culture, seems much more difficult than that of some other fruits. The culture, however, is rapidly increasing. With us, some few localities produce the old Virgouleuse in perfection; but it is usually brought into our market from the western part of the State, where it flourishes well. We have always a tolerable supply of this fruit in its season. The worst liability of this tree is often the sudden death of its large branches. The cause is now, I believe, in discussion among our pomologists. The fruit is sold in our market from the lowest mark up to $5 and even $6 per bushel.

Statement of H. R. ROBEY, *of Fredericksburg, Spotsylvania county, Virginia.*

Our soil and climate are well adapted to the growth of the pear. I have never seen a case of blight. They do well in almost every kind of soil, but best in a clayey loam. The trees are found to do far better when trained with low heads, so as to preserve the trunks from the sun. My finest trees—20 to 25 feet high—have their lower branches only three feet from the ground; and when they are loaded with fruit, the lower ones bend to the earth. The bark on the trunk is nearly as smooth as a young tree in the nursery.

The following kinds are good only when engrafted on the quince stocks:

Louise Bonne de Jersey.
Dutchess d'Angoulême.
Glout Morceau.
Beurré Diel.
Easter Beurré.

Golden Beurré of Bilboa.

The following succeed on pear stocks:

Buffum.
Bartlett.
Butter or Virgouleuse.
Beurré d'Aremberg.
Beurré Oswego.
Beurré d'Amanlis.
Beurré d'Anjou.
Dutchess d'Angoulême.
Inconnue Van Mons.
Liberole.
Fondante du Bois.
Fondante de Automne.
Flemish Beauty.
Josephine de Malines.
Louis d'Orleans.
Lawrence.
Madeleine.
Winter Nelis.
Napoleon.
Nouveau Poiteau.
Seckel.
Tyson.
Triomphe de Joidoigne.
Urbaniste.
Van Mons Léon le Clerc.
Taylor.

Many of these pears do equally well on quince stocks. Some kinds, however, will not grow on the quince without double work.

PEACHES, APRICOTS, AND NECTARINES.

"The facility of raising the peach from the stone," remarks a modern writer, "has probably tended to its general diffusion throughout the world. This fruit has steadily followed the progress of civilization; and man, from China to Peru, has surrounded himself with the luxury of this and of the other stone-fruits, very soon after he has begun to taste the blessings of a settled life. There are still spots where ignorance prevents portions of the human race from enjoying the blessings which Providence has everywhere ordained for industry; and there are others where tyranny forbids the earth to be cultivated and produce its fruits. The inhabitants of the Haouran, who are constantly wandering, to escape the dreadful exactions of some petty tyrant, have neither orchards nor fruit-trees, nor gardens for the growth of vegetables." "Shall we sow for strangers?" was the affecting answer of one of them to Burckhardt. "One of the greatest blessings," continues he, "that can be conferred upon any rude people, (and it is a blessing

which will bring knowledge, and virtue, and peace, in its train,) is to teach them how to cultivate those vegetable productions which constitute the best riches of mankind." The traveller Burchell rendered such a service to the Bachapins, a tribe of the interior of Southern Africa. He gave to their chief a bag of fresh peach-stones, in quantity about a quart; "nor did I fail," says the benevolent visitor of these poor people, "to impress on his mind a just idea of their value and nature, by telling him that they would produce trees which would continue every year to yield, without further trouble, abundance of large fruit of a more agreeable flavor than any which grew in the country of the Bachapins."

It is not certain in what part of the globe the peach-tree was originally produced; for, although we have early accounts of its being brought to Europe from Persia, it does not follow, from thence, that it was one of the natural productions of that country. Pliny relates that it had been stated to have possessed venomous qualities, and that its fruit was sent into Egypt by the kings of Persia, by way of revenge, to poison the natives; but he treats this story as a mere fable, and considers it the most harmless fruit in the world; that it had the most juice and the least smell of any fruit, and yet caused thirst to those who ate of it. He expressly states that it was imported by the Romans from Persia; but whether it was indigenous to that country, or sent thither from a region still nearer to the equator, we have no information. He adds, that it was not long since peaches were known in Rome, and that there was great difficulty in rearing them. He also informs us that this tree was brought from Egypt to the Isle of Rhodes, where it could never be made to produce fruit; and from thence to Italy. He says, moreover, that it was not a common fruit either in Greece or Natolia. No mention, however, is made of it by Cato. Pownall, in his "Roman Provinces," makes it a Phocæan importation to Marseilles; and evidently it was cultivated in France at an early period, as Columella, in his account of this fruit, says:

> "Those of small size to ripen make great haste;
> Such as great Gaul bestows, observes due time
> And season, not too early, nor too late."

Dr. Sickler considers Persia as the original country of the peach, which in Media is deemed unwholesome, but, planted in Egypt, becomes pulpy, delicious, and salubrious. According to Royle, it grows in Persia both wild and in a state of cultivation, and flourishes on the Himalayas at elevations of 5,000 to 6,000 feet above the sea.

The *nectarine* is considered by some as a distinct species; but there can be no doubt on this point, as the peach itself is believed to be nothing more than an improved or fleshy almond, which bears a similar relation to the peach and nectarine, as the crab does to the apple, and the sloe to the plum. To prove that the peach and nectarine are essentially the same, it may be mentioned that the fruit of both have been found on the same branch; and even various instances are recorded where the fruit had the smooth surface of the nectarine on one side, and the downy skin of the peach on the other.

The peach was introduced into the British North American colonies soon after their settlements by Europeans. The stones were ordered

by the "Governor and Company of the Massachusetts Bay in New England," in 1629.

Both the peach and nectarine, as well as apricots, are mentioned by Beverley as growing abundantly in Virginia in 1720. Some of the former are represented to have been 12 or 13 inches in circumference. They were raised so easily that some cultivators planted orchards of them purposely for feeding hogs; while others made a drink of them, called "mobby," which either was drunk as cider, or distilled into brandy.

Peach-trees, as well as those of the quince, are mentioned by Colden as having been killed by frost, in the province of New York, in 1737, but the apple and pear-trees were not hurt by the cold.

The peach was introduced into Louisiana by the Spaniards prior to its settlement by the French, where it has been since grown spontaneously, and, in many respects, apparently indigenous.

This tree was introduced on "Peach Blossom" plantation, at Easton, Talbot county, Maryland, by George Robbins, in about 1735. The stones were received from Peter Collinson, of England, together with the seeds of the pear.

CONDENSED CORRESPONDENCE.

Statement of S. S. Boyd, *of Jacksonsburg, Wayne county, Indiana.*

But few peaches have been raised here for the last fifteen years. Before that time, whilst the soil was new, they were produced in abundance, with no other labor than planting the trees in the corners of fences and other waste places. Now, by the "yellows," the peach-tree borers, and the cold winters, the trees, if planted, will seldom live to the age of eight years; and in that time, perhaps, not produce one crop of fruit—the buds being winter-killed or destroyed by late spring frosts.

Statement of Micajah Burnett, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Peaches are not extensively cultivated with us, owing to two causes, namely: the uncertainty of the crop, and the effects of the grub in the root of the tree. No effectual remedy has yet been discovered against the fly or insect that deposites her eggs at the root; and the only certain way of saving the tree is to examine for the grub, after it is formed, and remove it with a wire, brad-awl, or the point of a knife.

The fruit has been winter-killed or destroyed in the bud but twice within the last twenty-five years. We cultivate a number of good varieties; but the Gross Mignone, Heath, Melocotones, and the Rare Ripe, are in the best estimation here.

Statement of H. W. HUNTINGTON, *near Trinity, Catahoula Parish, Louisiana.*

The peach-tree, with us, if neglected, will have its fruit destroyed by a worm, which is brought into being as it approaches maturity, and feeds upon its pulp and kernel until it falls to the ground. The worm afterwards makes its way into the earth, and comes out a moth in the spring, depositing her eggs in the germs of the young fruit, and thus destroys the hope of the cultivator.

A remedy in this case is found in keeping swine in the orchard, which will eat every peach as it drops, and the worms are of course destroyed.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine.*

The peach is not cultivated in this State except by a very few, in sheltered situations, as it is not suited to our climate. The habit of the tree is to grow late in autumn, giving the wood last made no chance to ripen, and the frost is sure to kill down the twigs 10 or 15 inches.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Peaches are seldom cultivated here with success. Occasionally, in a sheltered spot and a favorable season, a hardy seedling, and sometimes a worked tree, produces well. Further trial with home-raised seedlings, and the use of the plum as a stock on which to bud, may result favorably; but, thus far, results have been sufficiently discouraging, and not the less so from the fact that our markets are flooded with fine peaches from New Jersey, at very reasonable prices, during the months of August and September.

The obstacles to peach culture in this region are especially three:

1. The "peach worm," which is very troublesome in light sandy soils. It is, however, very readily and cheaply resisted by the watchful cultivator.

2. The "severity of the winter's cold." The question, whether the disastrous result is secured by the effect of the cold purely, or by the sudden succession of subsequent warm weather, is of little importance to the cultivator. It is enough for him to know that death to the fruit-buds of his peach-trees usually follows a few exposures of 12° or 15° Fahrenheit below zero. The occurrence of a single depression of 22° below zero, early in the morning of December 27, 1851, was most undoubtedly followed by the almost instantaneous death of three-fourths of the fruit-buds on some four hundred trees in my garden.

3. The "curled leaf," which, after all, is the most fatal obstacle to peach culture here. Quite commonly the cold of winter spares buds enough for a fair crop of fruit, and the month of April opens with fair prospects, which are perfectly blighted before its conclusion. Prematurely warm weather late in March, or during the month of April, swells the buds almost to bursting. Then succeeds cold weather, holding them in check sometimes, as in 1851, for thirty-six days. When vegetation finally recommences, the juices of the tree are in a morbid

state; most of the buds that had been previously so excited never open at all; and those that do, exhibit a sickly, stinted foliage, which speedily falls, presenting the phenomenon of the "curled leaf." Some writers refer it to insects; but these are seen in the final catastrophe, and are the plunderers merely of the morbid vegetation. It is especially worthy of remark, that sudden and severe chills, occurring in mid-summer, often cause a slight show of this disease. So well are the causes of curled leaf ascertained, that little is risked in predicting its speedy appearance, while, as yet, not a trace of it is seen.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

This part of the country is particularly distinguished for its nurseries of fruit and ornamental trees, and for its large and splendid orchards. Among peaches, the early Crawford does remarkably well with us. That variety seems to be rather taking the lead. It has thus far proved to be high-flavored, and a great and uniform bearer. Peach-trees, while leafing out in the spring, often suffer from severe frosts and cold winds. This evil can be partially remedied by planting the orchard on high and dry land; for there the trees will become hardy, and the late spring frosts do not settle. The depredations of the peach-grub are a serious trouble. The only reliable remedy is to dig around the trees where you see the gum oozing, and find and kill the grub. The great enemy and pest of the stone-fruits, however, is the curculio. It destroys annually immense quantities of plums, cherries, apricots, nectarines, and sometimes peaches. I tried last spring to prevent their getting upon the trees by tying around the trunks rings of cotton batting; although I succeeded in capturing quite a number of them, enough got to the tops of the trees to do the mischief.

Statement of PETER GROSS, *of Schnecksville, Lehigh county, Pennsylvania.*

The peach-tree with us has been gradually losing its health and vigor for some years past. The only remedy I have yet found to preserve them in a healthy condition is, to remove the earth at the root of the trees in the month of March, and tie some flannel or any old woollen stuff around the lower part of the trunk of each tree. Then put about two pounds of hen manure on the roots, and replace the earth. The flannel ought to extend into the ground as far as the roots will allow, and about six or nine inches above the surface of the ground. I have pursued this course for some years, and find it an entire protection against the borer and worms.

Statement of JOHN EICHAR, *of Greensburgh, Westmoreland county, Pennsylvania.*

A good many peaches are raised here—about as many as supplies the home demand. They are more or less affected with the "yellows" every year. An application of lime and ashes to the roots, and washing the trunk with soap-suds, will generally revive them. A greater profit can be realized from a peach orchard carefully managed and

attended to, than from any other crop that can be grown. A farmer in northern Ohio bought one hundred acres of poor land, at $15 per acre, and planted the entire farm with peach-trees. The third year, the crop sold paid for the land and trees, together with all expenses for labor, &c.; and the past season he has realized over $20,000 as the reward of his enterprise.

Statement of H. R. Robey, *of Fredericksburgh, Spotsylvania county Virginia.*

Peaches do well here, and the "yellows" are not known. The fruit grows as large and the quality is as good as in any section of the country. The varieties originating here are not so liable to have their bloom destroyed by frost as those coming from the North.

Statement of Chauncey E. Goodrich, *of Utica, Oneida county, New York.*

Apricots are scarcely cultivated here, except occasionally in city gardens. The tenderness of most varieties, and their liability to the attacks of the curculio, together with the lack of enterprise, have been reasons for this unfrequency. The fact that a few varieties, as the Breda and the Black, are really as hardy as the apple, and that the curculio may be resisted by cheap and effectual methods, should encourage their culture; and the more so, because this fruit fills a gap between the cherry and the peach in the succession of early fruits.

PLUMS.

The common domestic cultivated plum is believed to be indigenous to the South of Russia, Caucasus, the Himalayas, and to many parts of Europe. In England, and in some parts of the United States, it is sometimes found in hedges; but never truly wild. This species and many of its varieties are cultivated for ornament, or their fruit, in all the temperate countries of the habitable globe. Faulkner, in his "Kensington," makes the plum a native of Asia, and an introduction into Europe of the crusaders. Gough, in his "British Topography," says that Lord Cromwell introduced the "Perdrigon plum" into England in the time of Henry VII.

The introduction of this tree into the British North American colonies, probably dates back to the early periods of their early settlements. The stones were ordered from England by the "Governor and Company of the Massachusetts Bay in New England," in 1629.

Several valuable and interesting varieties have originated in this country, among which the Bolmar or Washington plum stands conspicuous. The parent tree is said to have been purchased in a market in New York, about the end of the last century. It remained barren for several years, till, during a violent storm of thunder, the entire trunk was severed to the earth by lightning, and destroyed. The part re-

maining in the ground afterwards threw up several vigorous shoots, which were allowed to remain, and finally produced fruit. Trees of this variety were first sent to England in 1819, to Mr. Robert Barclay, of Bury Hill; and several others were sent to the London Horticultural Society in 1821, by Dr. Hosack, of New York.

CONDENSED CORRESPONDENCE.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

We have twenty-five varieties of plums, of the finer kinds, in bearing. The curculio is occasionally very destructive to this crop; but the past season it was almost wholly exempt from it. The trees were loaded to the utmost capability of their bearing, with the finest fruit. Many of the Duane's Purple, Washington, and the Yellow Egg plum, measured from 6 to 6½ inches in circumference. The Washington, Duane's Purple, French, Yellow Egg, Imperial Gage, Green Gage, and the Lombard, are the most profitable varieties of any which we as yet have in bearing. One tree, only seven years from the graft, of the Yellow Egg variety, produced nearly four bushels of beautiful, sound fruit.

The best remedy for the curculio is to plant the trees in the poultry yard, or in a lot where the pigs are reared. In either case, the larvæ will be destroyed before they can enter the ground.

Statement of H. W. HUNTINGTON, *near Trinity, Catahoula Parish, Louisiana.*

The common plum, both red and yellow, is grown here abundantly; but no efforts of mine, protracted through twenty-five years, have been successful in the cultivation of the finer varieties of the North.

The plum is exclusively attacked by the caterpillar, which entirely eats the leaf, soon after which the fruit withers and drops.

Statement of HENRY. LITTLE, *of Bangor, Penobscot county, Maine.*

Bangor is acknowledged to be the headquarters of the plum, as much so as it is the great emporium of buying and selling lumber. The plum is cultivated extensively on the banks of the Hudson river, as well as in Montreal, (Canada,) and its vicinity; but never have I seen it grown in either of these places, nor elsewhere, in greater perfection than in this city. Here the trees bear bountifully, and require less care than other fruit-trees. Nor does curculio injure the plum crop in Maine so much as in other States. For years past the trees on this river have annually required support on account of the great weight of fruit on them, which should have been thinned out, but people generally neglect it.

The following varieties are popular in this market:

Autumn Gage, (late;) Apricot, (early;) Bingham, (large;) Bleecker's Gage, (large;) Coe's Golden Drop, (late;) Columbia, (very large;) Corse's Nota Bene; Diapree Rouge, or Mimms, (large;) Duane's Purple, (large;) Drap d'Or; Early Favorite, or Rivers' No. 1, (small;) Emerald Drop; Frost Gage, (late;) Green Gage; Hudson Gage; Hulings' Superb, (shy bearer, very large;) Imperial Gage, (noted bearer;) Imperial Ottoman, (early;) Jefferson, (large;) Kurke's, (large;) Knight's Green, (drying;) Lawrence's Favorite; Lombard; McLaughlin, (originated in Bangor; large and handsome;) Orange, (large;) Penobscot, (large;) Peach Plum, (large;) Purple Favorite; Purple Gage; Red Gage, (small;) Royal Hâtif, (early;) Reine-Claude de Bavay, (late;) Sharpe's Emperor, (handsome, large;) Smith's Orleans, (large;) St. Martin's Quetsche, (late;) Thomas; Washington, or Bolmar, (large;) Washington Seedling, Ives', (large;) White Magnum Bonum, or Yellow Egg, (large;) Yellow Gage, (large.)

I should judge that, for two years past, every acre of well cultivated plum trees in this city has yielded an income of from $300 to $400 annually. I make this estimate by the plum crops in my own garden.

Washington.—This is a very desirable first-rate plum, a great bearer, is extensively cultivated, and is a popular market fruit in this city. Our soil and climate seem to be peculiarly adapted to this variety.

McLaughlin.—This new plum originated in Bangor, and is more extensively cultivated here than any other; yet scions have readily sold here for $1 50 per dozen, and in 1851, the demand was more than could be supplied at that price. For trees of this variety, our nurserymen receive from $1 to $10 each, according to size, and they are ordered from all parts of the Union. What is favorable to the plum is, the call is greater in this vicinity than from abroad. The trees are of very rapid growth. I have had them grow over seven feet in a single season. They bear well, and the fruit brings the highest prices in our market.

Green Gage.—This variety is considered indispensable, even in a small collection. It originated in France over three hundred years ago. It was called "Reine Claude," in compliment to the Queen. It was long afterwards brought to England by a man of the name of Gage. His gardener called it the "Green Gage," by which name it is known in England and the United States. It is considered one of the richest of plums.

The Imperial, Bleeker's, and other Gages, are excellent plums, but they will not command such high prices in the market as the larger ones—say, the Washington, McLaughlin, Columbia, Duane's Purple, Diapree Rouge, Coe's Golden Drop, Jefferson, and Ives' Washington Seedling—some of which are inferior in flavor to the smaller-sized plums.

Statement of SIMON T. ASHTON and ELIJAH MYRICK, *trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

We raise prodigious crops of plums, consisting of the Green Gage, Imperial Gage, Jefferson Gage, and other varieties. The ravages of the curculio are prevented by scattering air-slacked lime on the trees once a week for six weeks, beginning soon after the fruit is discoverable. When the dew is on, or a damp day, is the most favorable time, as the powdered lime will stick better when the trees are moist. It should be thoroughly sprinkled on every part of the tree until it has a white and wintry appearance. We have tried other remedies, but this requires by far the least labor, and succeeds the best.

We have transplanted some plum-trees in a poultry yard, to see what effect the fowls would have in preventing the ravages of the curculio. So far, the experiment gives promise of success, but a further trial will enable us to speak more decidedly.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The curculio has destroyed nearly all of our plums for the past two years. The only remedy which has proved effective is, to sprinkle flour of sulphur over the trees about the time the fruit is setting, and once or twice afterwards. We are not much troubled with mildew or blight.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Plums grow exceedingly well in Central New York—better, perhaps, whether we regard the health of the tree or the flavor of the fruit, than in many other places in the same parallel, East or West.

The diseases and evils to which the plum is liable are mainly three:

1. "Mildew" on the foliage, and rot on the fruit. This evil is occasioned apparently by that combination of heat and dampness of the atmosphere familiarly called "muggy weather." It is usually contemporaneous with mildew in grapes. Such weather occurring in August, rots the fruit more or less on all soils; but it is only on sandy ones that the foliage is mildewed and falls prematurely, often leaving the fruit but two-thirds grown. The probable remedy would be mulching the soil, so as to moderate the intensity of the heat and diminish the rapidity of growth, so as to produce a less succulent state of the wood. Trees well planted in a dry, generous soil, and then left without much culture, while the grass is permitted to cover the ground around the trees, would probably be found usually to escape, since such a course would produce a slow, hardy growth. Occasional moderate culture might be allowed early in the season.

2. The "black knot," which is virtually a disease or cancerous affection, has been variously charged to a diseased state of the sap, and an insect, as the curculio, or something else. It is here a terrible scourge to all plum-trees standing in dry, sandy soils; nor do those situated in clayey soils wholly escape. A tree attacked by it, and neglected a

short time, often becomes irretrievably ruined. The disease, which at first usually attacks the extremities of the young branches, begins to affect the body; notwithstanding, at this state of progress, if the knots be cut out deeply and faithfully, the malady returns again, bursting even from the denuded heart-wood, as though the whole circulation of the tree were prevaded by a spreading cancerous disease. Its affecting particularly trees growing on a soured soil, seems favorable to the idea that it is caused by insects, since a rich soil is most congenial to their habits. It is also, with me, most likely to affect the Bleecker and the Elfrey Prune, both free-growing sorts. This fact would seem favorable to the "poison sap" theory, since a rapid growth would be most liable to injury from atmospheric changes; but the Prince Imperial Gage, an equally rapid grower, is scarcely affected by it. Thus the free growth of a tree seems an ambiguous fact. If the affection is caused by the sting of an insect, there is, I doubt not, a resulting depravation, in extreme cases, of the whole circulation, causing an exudation of diseased juices where there were probably no stings inflicted. A tree very badly stung, seems doomed, since no removal of the excrescences will save it.

Captain James Mervine, of our city, thinks he has discovered an insect which causes the "black knot." The insect is about an inch long, color pale yellow, with four wings, hind-legs like the grasshopper; using its wings only for calling its mate, which it does by rapid vibrations, causing a shrill note. The abdomen of the female is larger than that of the male, and covered with a concealed sting, one-fourth of an inch long, with which it makes a dozen or more perforations for the deposite of its eggs; the cells being placed longitudinally, each egg being accompanied by an acrid poison. These eggs are deposited mostly in September. The cells are varnished over with a water-proof substance of a dark, glazed appearance. The limb, on being split, exhibits the young in the larva state, in the month of June. The excrescence does not appear until after the escape of the insect. It is caused by the sap being arrested in its circulation by the poison infused.

The curculio.—This, after all, is the great enemy to successful plum cultivation, especially in sandy soils. Though many specific remedies have been published, it still continues its ravages as formerly. Yet few persons, comparatively, have ever seen the cause of so much mischief; though any one, by going under the tree with an inverted umbrella, in the month of June, may readily catch one or more of these insects by a sudden jar of the tree.

Two comparatively old remedies for the curculio will, in general, be found reliable—first, the plan of destroying it by "the free admission of swine and poultry about the tree, until midsummer;" second, "the use of a spread sheet attached to a frame."

Statement of H. R. Robey, *of Fredericksburg, Spotsylvania county, Virginia.*

Plum-trees, with us, are healthy, and grow well; but the curculio allows very little fruit to ripen; and the same may be said of the apricot and nectarine, unless the ground is paved under the trees.

Statement of GUSTAVUS DE NEVEN, *of Fond du Lac, Fond du Lac county, Wisconsin.*

For raising plums, this county will probably be unsurpassed. The trees make the most astonishing growth; I have seen shoots of one year's age eight feet long; six feet is quite common. The whole timbered country is full of wild plum-trees, which answer well as grafting-stocks. A common error is to set grafts too high upon these; the graft outgrows the stock, which is of slow growth, and after a few years the tree becomes top-heavy, and is liable to be broken down by the wind. This is prevented by grafting but a few inches above the roots, and working the soil up to the place of union.

The curculio is a most destructive insect to the plum, and I know, as yet, of no satisfactory preventive to its depredations. Shaking the tree with a sudden jerk early every morning, while the insect is torpid, dropping it upon sheets spread below, and crushing it, is the best method I know of; but many escape the operation, and much of the fruit is destroyed, or made worthless, by this depredator.

Good plums, with us, are sold from 8 to 12½ cents per quart

CHERRIES.

The common cherry-tree is regarded by ancient authors as a tree of Asiatic origin; but whether it is truly indigenous to any part of Europe, several modern writers differ in opinion. Pliny states that it did not exist in Italy till after the victory which Lucullus won over Mithridates, king of Pontus, sixty-eight years before the Christian era. He tells us that, "in twenty-six years after Lucullus planted the cherry-tree in Italy, other lands had cherries, even as far as Britain, beyond the ocean." He mentions eight kinds of cherries as being cultivated in Italy at the time he wrote his "Natural History," which was A. D. 70. "The reddest cherries," says he, "are called *apronia;* the blackest, *actia;* the Cæcilian are round. The Julian cherries have a pleasant taste, but are so tender that they must be eaten when gathered, as they will not endure carriage." The Duracine cherries were esteemed the best,* but the Picardy and Portuguese cherries were most admired. The Macedonian cherries grew on dwarf trees; and one kind is mentioned by the above-named author which never appeared ripe, having a hue between green, red, and black. He mentions a cherry that was grafted, in his time, on a bay-stock, which circumstance gave it the name of *laurea;* this cherry is described as having an agreeable bitter flavor. "The cherry-tree," continues he, "could never be made to grow in Egypt, with all the care and attention of man." According to Abbe Roiser, Lucullus brought into Italy only two superior varieties of cherry; the species which were the origin of all those now in cultivation being, before his time, indigenous to Italy, and to the forests of France, though their fruit was neglected by the Romans. It is affirmed by Faulkner, in his "Kensington," that the cherry was introduced into

* It was the opinion of Loudon that the Julian and Duracine cherries, mentioned by Pliny, were varieties of the Cerasus sylvestris.

Britain about A. D. 53. Gerard, in his "Herbal," published in 1597, figures a double and a semi-double variety of cherry; and of the fruit-bearing kinds, says there are numerous varieties, among which he mentions the "Morello, or Morel," and the "Flanders or Kentish cherries."

At present, the common cherry is extensively cultivated as a fruit-tree throughout the temperate regions of the civilized globe; but it does not thrive in very high latitudes, nor within the tropics, unless grown at considerable elevations. It is found in Russia as far north as latitude 55° or 56°; and ripens its fruit in Norway and East Bothnia, as far as latitude 63°. It is also found in the North of Africa, and on several islands in the Mediterranean, but it does not attain so large a size in the last-named places as in higher latitudes.

The introduction of the cherry into the British North American colonies dates probably back to the early periods of their settlements. The stones, among other seed, were ordered to be imported from England by the "Governor and Company of the Massachusetts Bay in New England," in 1629. Some of the oldest trees known to exist in this country are at Yonkers, near New York, and are said to have been planted in about the year 1650, by Frederick Philipse, the founder of Phillipsburgh, the former name of that place. At Point Pleasant, in Bristol, Rhode Island, on the estate of Robert Rogers, there also exist several old cherry-trees, which are believed to have been planted over two hundred years.

CONDENSED CORRESPONDENCE.

Statement of S. S. Boyd, *of Jacksonsburg, Wayne county, Indiana.*

Of cherries, the common "Red" and "Black Morello" grow well, and bear in great abundance. Recently, attention has been directed to the better varieties; some of which promise a rich reward. The "Early Mays," particularly, are hardy trees, and seldom fail to bear most bountifully of fine early fruit.

Statement of Micajah Burnett, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

The cherry is free from disease, and nowhere, perhaps, is the fruit produced in greater perfection than in this locality. We have a "Heart" tree, which does not exhibit the least sign of disease or decay; the top of which is 55 feet in diameter, and which, at the distance of five feet above the surface of the ground, girts eight feet.

The Graffin, Belle de Choisy, May Duke, and English Morello are the surest crop; but the Heart and other varieties do well. We have the Bigarrean, Black Tartarian, and other varieties, not yet in full bearing, which promise well.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine*

The cherry, with us, is not so abundant as the plum. The Kentish, or Early Richmond, is more extensively cultivated than any other variety. This is a sure and a great bearer, and is grown with little care. It is also the hardiest of cherries.

Among others cultivated, there are the following: Black Eagle, Black Heart, Black Tartarian, (tender,) Bigarreau or Yellow Spanish, Belle de Choisy, Coe's Transparent, Downer's Late Red, Downton, Elton, Knight's Early Black, May Duke, Roberts's Red Heart, Sparhawk's Honey, Sweet Montmorency, Belle Magnifique, (on trial.)

Statement of SIMON T. ASHTON *and* ELIJAH MYRICK, *trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

Out of sixty choice varieties of the cherry growing on our ground, the "Look no Further," or *Ne cherchez plus* of the French, is decidedly the best. This cherry, for the very desirable qualities of great productiveness, sweet and delicious flavor, extraordinary size, and beauty of appearance, is unequalled. Some that we measured were three inches in circumference. This fruit was sent to the Massachusetts Horticultural Society exhibition last summer, and the sample was superior to the carefully-culled specimens of the finest cherries on the tables. This cherry was obtained from the royal gardens of the Luxembourg, in Paris, and imported to this country by Samson V. S. Wilder, formerly of Bolton, Massachusetts, in 1815. Although we find this an indifferent grower in the nursery, yet it makes a stately tree, with rich and luxuriant foliage.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Cherries are extensively cultivated here. Fine varieties are plentiful in our city market, at from $2 to $4 per bushel.

The curculio, black knot, and the bursting of the bark, are n t yet considerable evils in the culture. The greatest obstacle to the healthful growth of the tree is found in a sun-scald on the southwest side of the tree. The obvious remedy is enveloping the trunks up to the large limbs with straw, or any loose substance which will shut off the direct rays of the sun. The use of two narrow boards nailed together and set at right-angles against the tree is still better, as they do not shut out the air, nor diffuse light; nor do they afford a harbor for insects. And what is still better, let the tree be headed low, so that it will early shade not only its own body, but also its roots, from intense heat. Such a mode in the cultivation of fruit-trees in a climate so hot as ours is very important. I find that most fruit-trees headed so low that the direct rays of the sun never strike the soil immediately about the roots, except in the early morning or near sunset, do better than when otherwise trained.

QUINCES.

The quince is supposed to have been originally a native of Sidon, a city of ancient Crete, now the island of Candia; but it is much more probable that it was only first brought into notice in that city. It is considered, at present, as indigenous to the south of France, particularly on the borders of the Garonne, and to Germany, on the banks of the Danube. It was known to the Greeks and Romans, and both nations held it in high estimation. Columella says: "Quinces not only yield pleasure, but health." He speaks of three kinds: the "Struthian," the "Must Quince," and the "Orange Quince." Pliny mentions many kinds, some growing wild in Italy, and others in cultivation, so large that they weighed the boughs on which they grew down to the ground. He also says that some were of a green and others of a golden color, the latter of which were called *chrysomela*. The only kind that was eaten raw, he states to have been raised by grafting the large quince upon the stock of a smaller variety called *struthla*. "All kinds of this fruit," continues he, "are grown in boxes, and placed within the waiting-chambers of our great personages, in which men wait to salute these personages as they come forth every morning." It appears, from the same author, that quinces were used to decorate the images of the gods, which were placed in sleeping-chambers, round the beds; whence it follows that the Romans did not think that there was anything either injurious or unpleasant in their smell. He gives directions for preserving the fruit by excluding the air from them, or boiling them in honey; or, by plunging them in boiling honey—a practice in use with this and other fruits, in Genoa, at the present day. He also writes much on the medicinal qualities of this fruit. "Quinces," says he, "when eaten raw, if quite ripe, are good for those who spit blood or are troubled with hemorrhage." The juice of raw quinces he states to be a sovereign remedy for the swollen spleen, the dropsy, and difficulty of taking breath, particularly to those who cannot conveniently breathe except when in an upright position. The flowers of the quince, either fresh or dried, he tells us, are good for inflamed eyes.

The introduction of the quince into the British North American colonies probably dates back to the early periods of their settlements by Europeans. The "Governor and Company of the Massachusetts Bay in New England," ordered the seeds to be imported from England in 1629. This fruit is mentioned as growing in Virginia, in great perfection, as early at 1720. Colden speaks of it as having been killed by frost in 1737 in the province of New York.

CONDENSED CORRESPONDENCE.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

The quince-tree, when planted in a good soil, thrives well with us, and bears good crops. It requires no further care nor attention than an

apple-tree. The "Apple-shaped" or "Orange Quince" is most highly esteemed here. We sometimes propagate it in the nurseries for the purpose of dwarfing the pear.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine.*

The quince is grown in the western counties of the State, also on the Kennebec river, to a limited extent; but the climate is too severe in the northern counties for the quince or the peach. It will be recollected that our State has, from east to west, over 300 miles of sea-coast, extending nearly from latitude 43° to 48°, or about one degree further north than Quebec. There is, therefore, and will ever be, a great difference in climate between the northern and southern portions of Maine.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Quinces are coming rapidly into cultivation here. Twelve years ago there were not more than half a dozen bearing trees in and about this city. Now, many families raise their own. The supply of our market with this fruit has usually been from the western part of the State. They are retailed here to private purchasers, at from 31 to 50 cents the peck, according to the supply in market. Deep and rich soil is found best for the culture of this fruit. Mulching in dry summers is also found useful. The use of salt, once considered indispensable, is now, I think, entirely abandoned. The liabilities of this fruit to injury are few; occasionally, during a mild winter, its young wood is killed in spots where it is too much sheltered. It is also sometimes injured by the borer. Practically, however, this insect is disregarded.

GRAPES AND WINE.

The wine-bearing grape of Europe has long been celebrated in the Old World, and may be traced back to the remotest antiquity. Its cultivation was probably among the earliest efforts of human industry; for we read that one of the first acts of Noah, after being saved from the deluge, was to begin "to be an husbandman, and planted a vineyard;" thus plainly indicating that the planting of a vineyard, even at that early day, was deemed one of the primary and most important acts of him who tilled the earth. From that period, the grape, among fruits, has been what wheat is among the Cereals, or the potato among farinaceous roots; and, like them, in every country where it would thrive, has been cultivated with pre-eminent care.

According to Humboldt, the vine grows wild on the coasts of the Caspian Sea, in Armenia, and Georgia, and it is naturalized, at least, in most of the temperate regions of the globe. Dr. Sickler, of Germany, in his "Geschichte der Obst-Cultur," has given an interesting

account of its migration to Egypt, Greece, and Sicily. From the latter, which is regarded as one of the oldest seats of civilization in Europe, it has been stated that it found its way into Italy, Spain, and France, and subsequently into Britain. On the authority of Strabo, the vines of Languedoc and Provence produce the same kind of fruit as those of Italy, which undoubtedly sprang from the same origin. At about the year 85, the culture of the vine had become general in the Southern and Middle Departments of France, and gradually extending itself over the other parts of Gaul, when Domitian, being informed of the great scarcity of grain in the Roman dominions, imputed it to the vast increase of vineyards in Italy and the provinces, which he thought was the cause that rendered agriculture too much neglected; and deeming also their existence to so great an extent as an incitement to sedition, from the encouragement they gave to intemperance, he issued an edict prohibiting the planting of any new vineyards in Italy, and ordering the whole (some historians say one-half) of those in the provinces to be destroyed. This privation lasted about two centuries, during which no vineyards could be planted without permission of the Emperor; and the provincials did not receive permission to replant them until about the year 280, when Probus, after numerous victories, which gave peace to his empire, manifested a great desire to encourage agricultural pursuits in all the provinces, and rescinded the edict of Domitian. The renewal of this privilege appears to have been received with great satisfaction; for tradition still retained in the memory of the Gauls the great advantages that species of culture had afforded them; and the vines of Sicily, Italy, Greece, the Archipelago, and Africa, were again transplanted to the provinces of Gaul, and became the parents of the innumerable varieties which now cover with vineyards the territories of France. This species has existed for ages, in a wild state, in the woods and hedges of Provence, Languedoc, and Guienne, where it differs from the cultivated vine, in having smaller and more cottony leaves, and very small fruit, rather austere than sweet. These wild vines, which were called *labrusca* by the Romans, are still known in the south of France by the names of *lambrusca* and *lambresquiero*. The vines which are found wild in America, let it be understood, are very different from these, though, if cultivated, doubtless some of them would improve in quality, equal, if not superior, to the grape of the Old World.

The extent of territory over which the vine culture may be advantageously diffused in this country, has long afforded a theme of much speculation. It early attracted the attention of the first colonists, who not only attempted to form vineyards of the European vine, but to make wine from our own native grapes. Although the subject has been zealously and sedulously pursued at various periods since, all those dwelling on the easterly half of the continent who have made trial of the foreign grape have never been able to bring their designs to perfection; and most of those who have tested their skill in our native varieties, have only met with partial success; yet a degree of perseverance and enthusiasm seems to have pervaded all the votaries of this delightful pursuit, and a warm and mutual interchange of views and sentiments have existed among them, which has been comparatively unknown in

other species of culture. Although the operators in recent times, from being interspersed over so great an extent of territory, are consequently more widely separated, still the connecting link, by a friendly co-operation in one common cause, may justly and appropriately assimilate their united exertions to that joyous period in the history of France when, during the reign of Probus, thousands of all ages and sexes united in one spontaneous and enthusiastic effort for the restoration of their vineyards. Indeed, when the far greater limits of our domains are considered, the combined efforts of our fellow-countrymen cannot fail to produce effects even more important, from the great extent of their influence, and cause each section of our Republic reciprocally to respond to the efforts of others, with all their attendant advantages and blessings.

The earliest attempts to establish a vineyard in the British North American colonies, was by the "London Company," in Virginia, prior to 1620. By the year 1630, the prospects were sufficiently favorable to warrant the importation of several French *vignerons*, who, it was alleged, ruined them by bad management. Wine was also made in Virginia by a Captain Brocas, in 1647; and in 1651, premiums were offered for its production. On the authority of Beverley, who wrote prior to 1722, there were vineyards in that colony which produced 750 gallons a year.

In 1634, the yearly rent of Governor's island, in Boston harbor, was a hogshead of wine. That island had been granted to Governor Winthrop, April 3, 1632, on condition that he should plant a vineyard or an orchard thereon.

Beauchamp Plantagenet, in his "Description of the Provinces of New Albion," published in London, in 1648, states that the English settlers in Uvedale (now in Delaware) had vines running on mulberry and sassafras trees, and that there were four kinds of grapes. "The first," says he, "is the Tholous Muscat, sweet-scented; the second, the great Foxe and thick grape, after five moneths reaped, being boyled and salted, and well fined, it is a strong red Xeres; the third, a light claret; the fourth, a white grape, creeps on the land, maketh a pure, gold-color wine. Tenis Pale, the Frenchman, of these four made eight sorts of excellent wine; and of the Muscat, acute boyled, that the second draught will fox (intoxicate) a reasonable pate, four moneths old; and here may be gathered and made two hundred tun in the vintage moneth, and replanted, will mend."

An attempt to establish a vineyard near Philadelphia was made by William Penn, in 1683; also by Andrew Dore, in 1685; but neither succeeded.

In 1769, the French settlers on Illinois river made upwards of 100 hogsheads of strong wine from the American wild grape.

In 1804, a Swiss colony settled at a place called "New Switzerland," on the Ohio river, now Vevay, in Indiana. By the year 1810, they had eight acres planted with vines, in full bearing, from which they made 2,400 gallons of wine, then said to be very good. Since that time, their vineyards have been considerably extended.

According to the census returns of 1840, the wine crop of the United States amounted to 124,734 gallons; of 1850, 221,249 gallons; show-

ing an increase of 96,515 gallons. The amount made in 1853, including New Mexico and California, may be estimated at 2,000,000 gallons, which may be valued at $2,000,000.

CONDENSED CORRESPONDENCE.

Statement of JAMES S. WAITE, *of San Gabriel, Los Angelos county, California.*

The grape culture in this county has received the most attention from Mexicans, although it has been pursued to a considerable extent by Americans. There are three varieties of grape cultivated—two black, and the muscatel or white. I have had but little experience in the management of vineyards, and hence can say but little about them.

Large quantities of grapes are annually sent to San Francisco and the mines. Last season not far from 1,500 tons were exported from this county, the entire product being estimated at 2,000 tons. They are carefully picked from the vines, and packed in saw-dust, which preserves them from bruising in the transportation.

Statement of HON. E. CRAWFORD, *near Blakely, Early county, Georgia.*

The Skuppernong, Warrenton, and the Devereux grapes, are natives—the first of North Carolina, the latter two of Georgia; and all of them certain and prolific bearers. Successful attempts have been made at wine-making from these grapes; and there is no doubt that if our cultivators could realize as much, or more, money from the production of this excellent beverage as from cotton, that vile fluid, whiskey, would soon be unknown among us.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

The Catawba and Isabella do well here, and the fruit is equal to any of the kinds produced in this latitude. We have but little experience in wine-making; but some of our acquaintances, who raise it, succeed in the business, and consider it profitable. It is an easy matter to produce the grape, and many farmers, in consequence, have it in abundance for family use. So far as my experience goes, the Catawba and Isabella are the only varieties that can be profitably cultivated in this region.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine.*

We raise under glass the Black Hamburg, Chasselas, and others of the fine foreign varieties. In open culture, we plant in this city the Isabella, Clinton, Black Cluster, and White Sweet-water.

Several other varieties are planted on trial. The Isabella is too late in ripening for this State. The others do somewhat better. We are searching for good early-ripening varieties.

Statement of EUSEBIUS WESTON, *of Bloomfield, Somerset county, Maine.*

Wines have been manufactured here of a delicious flavor from red currants, and some from the black. I take clear, well-picked currants, press out the juice in a common cheese-press, and add to it about the same quantity by measure of good cold water; I then add about 20 to 25 pounds of good white sugar, and stir it thoroughly; set it in a cool place to ferment, leaving the bung out to work off the vegetable matter remaining; fill the barrel, and bung it up tightly. In this way my wine remained good for five years. Others have cheap sugar and more water, which is attended with less cost and less value. My wine I sold for sickness, and it was highly approved. At the present price of sugar, such wine may be manufactured for $5 per barrel, and will sell, when made, at $1 per gallon.

Statement of DAVID BRUMBAUGH, *of Marsh Run Mill, Washington county, Maryland.*

Not much attention has been paid to the cultivation of the grape in this county; but from the success within the last few years, in a small way, I am fully convinced that our soil, climate, and location are admirably adapted to its culture, being less liable to disease than in many other parts of the country, or in Europe.

The common Fox grape, with all its varieties, is found growing spontaneously over the county; and a variety of the Catawba is thought by some to be growing spontaneously, and in great abundance, on the Blue Ridge, which separates this county from Frederick. The Catawba and Isabella are the favorite varieties, being hardy, full, and constant bearers.

There has not been much wine made yet, except in a small way; but that has been pronounced by good judges to be equal to the wine made on the Rhine.

Statement of SIMON T. ASHTON and ELIJAH MYRICK, *trustees of the United Society of Shakers, at Harvard, Worcester county, Massachusetts.*

We have several varieties of native table grapes, which we think only need be known, to become favorites. These are called the Harvard Seedling, Black Cluster, Sage Grape, and Early Amber—the last mentioned being the sweetest and most admired of all. A committee of the Middlesex Agricultural Society, on their tour of inspecting farms, called here and tasted this variety, and pronounced it the best native they had ever met with, each of them immediately ordering a vine. There is but one opinion with all who have tasted this grape. It ripens early in September, sufficiently early to be out of the way of ordinary frosts, and needs no protection. The other kinds are val-

uable, but not so sweet, especially the Black Cluster, which bears large, compact, beautiful clusters that would be very attractive as a market fruit—perhaps more valuable, on account of its fine clusters, for the market, than even the Amber. These varieties all ripen within a short time of each other. The Harvard Seedling and Black Cluster were raised in this town from seed. The Sage is a very large and good grape, though some object to its foxy taste, while others are the more fond of it. This grape is already somewhat extensively known as we have supplied orders for the vines from several different States; but the Amber is taken as readily at $2 each, as any others at $1. We have been in the culture of native grapes for twenty years, and have extensively attempted the cultivation of the Isabella and Catawba, but have utterly failed in these choice varieties on account of their late ripening. We have now some twenty sorts recommended for the cultivation in open air. The four varieties named above are the most select of all we have raised or seen.

Statement of ANTHONY MILLER, *of Portland, Calloway county, Missouri.*

My observations have led me to the belief that the "rot" in the grape depends on a weakness in the vine, even when the ground is rich and well-manured. This disease, consisting only in weakness, befalls the vines soon after they bloom. Following this notion, I thought of a remedy, which consists of the following: I take fresh cow manure, (without straw, leaves, &c., being mixed with it,) which I mix in a ditch, or in a large hogshead, with slops, wash-water, &c. I stir it once a day until it begins to ferment, and leave it standing several days, and then it is ready for use. When I have no cow manure, any other animal manure, mixed with the offals of tobacco, ashes, lime, and rain-water, will answer the same purpose. Of this fluid I pour about a gallon around the roots of every grape-vine, making a small ditch, five or six inches deep, around the vine, to keep the fluid from running off. When it has soaked into the ground, I cover up the ditch with earth. A month after the blooming of the vine, I repeat this again. In this manner I have kept my grapes sound.

This remedy can be tried without expense or much trouble, and on a few vines at a time, until the owner convinces himself of its usefulness. I take it to be the only thing which will preserve the grape against the influence of dews, rains, or other unknown causes which may hurt the health of the vine.

Statement of JAMES L. MINOR, *of Jefferson City, Cole county, Missouri.*

Wine is produced in this State, by our German population, in very considerable quantities. It is of the character of the Rhenish wines, and is generally made from the Catawba grape, which flourishes under the culture of this class of wine-growers. The vine is usually grown on hill-sides, sometimes so steep as to require terracing; the culture of the grape, and the manufacture of wine, being the same here as in the vineyards of the Rhine.

The cost of manufacture I am not able to state, as it varies with the thrift, skill, and conveniences of the producer. The value of the wine here is generally $1 per gallon.

Statement of FREDERICK MUNCH, *of Marthasville, Warren county, Missouri.*

The "rot," almost the only impediment to be struggled against by American wine-growers, is clearly and doubtless nothing else than a mildew, befalling the whole plant, the leaves and tendrils, as well as the berries, caused by a sudden change in the temperature of the atmosphere, as a cool night, followed by a hot and sultry day. Such changes are of frequent occurrence here, and make our climate what we call "chilly." All vegetables are not equally affected alike—some more, some less, and others not at all. Even among the different varieties of the grape, there is a difference in that respect. Vines of a spongy texture, with a thick pith, easily growing from cuttings, such as the Catawba, Herbemont, Isabella, &c., as well as most of the foreign vines, suffer most. Those of the opposite qualities are less delicate, and must be chiefly propagated by grafting or layers, and ordinarily stand our climate well. To the latter belong the Halifax, and all the native vines of the Mississippi valley, all with a highly-colored juice, which makes a dark-red wine.

Although I admit that the Catawba is unsurpassed for the superior wine it yields; yet I say again, if wine is to become in this country anything more than a luxury for the rich; if we design to raise a wholesome, recreating, and, at the same time, cheap beverage, to which everybody may have access, we must not merely rely on the Catawba. From one stock of the Halifax, I raised this year two gallons of wine, while my crop of the Catawba was nearly a failure. Some of my neighbors had better luck, probably because of more sheltered situations. On the whole, the yield of this year was considerably more abundant than of the two preceding, and the quality promises to be excellent. Next year, I shall have about half a dozen new varieties, natives of the Mississippi valley, and cultivated by me with a great deal of care, to bear for the first time.

Statement of WILLIAM H. SOTHAM, *of Piffard, Livingston county, New York.*

In this vicinity there is a vineyard, owned by Mr. Samuel Warner, of about 1¾ acres. His vines are planted in rows about eight feet apart. Some of them are trained to wooden trellises, others to posts and wire. He made 40 barrels of wine from the pure juice this year. This vineyard will make, including labor and sugar, full $2,000 worth of wine, at $1 50.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

The Isabella and Catawba grapes seldom ripen well in open culture in this parallel, after leaving the Hudson, before we reach the lake

influence at Syracuse. The present season, however, has been an exception, being the first in eleven years that these varieties have fully ripened in perfectly open culture. In this city, on brick walls, and amidst the shelter of high close fences and yards, the Isabella ripens tolerably well in most years. Some of our varieties of Frost grapes yield a tart fruit, which is very rich when gathered late. Unfortunately, however, most of them are shy bearers when transplanted into our gardens. There are also two or three varieties with large berries, of early maturity; but one of them, a very shy bearer, makes loose clusters, from which the berries fall easily as soon as ripe. They all, moreover, have thick skins and a hard pulp. A variety as hardy, productive, and valuable for the table as the Isabella or the Catawba, and early enough to mature habitually, is a very great desideratum here. Such a grape, I have little doubt, could be produced by crossing some of the hardiest foreign sorts with the Isabella or Catawba. It could also probably be raised from their seed. The experiment should be tried on a large scale if possible.

The only valuable grapes that habitually ripen early enough in this climate are the Early Black, July, Miller's, Burgundy, Violet, and some varieties of the Sweet-water, such as the Early Malvasia and the Royal Muscadine. There are perhaps a few other foreign sorts that would mature in season. These, it will be seen, are all foreign varieties. In seasons that are steady, warm, and dry, all of these ripen well and produce largely; but in seasons that are cold and irregular, as also those which are hot and wet, foreign grapes are sure to mildew, and often fatally, though the timely use of sulphur is frequently found to save them. It is worthy of consideration, that when the grape is mildewed by hot and wet weather, the balls and the foliage of the potato are similarly affected.

The most successful mode of grape culture includes a deep, dry soil, but moderately rich, with a free exposure to air and light, involving, of course, close trimming and wide culture. It will also be found that after giving the vines earth and faithful culture, a little wholesome neglect in midsummer, by letting the grass and small weeds grow, will prove useful. The *rationale* of this is, that in this way the luxuriance of growth is prevented, and the hot sun affects the roots less. In short, it is but another mode of "mulching." I suggest these thoughts with diffidence, although they are forcibly commended to my judgment by the experience of the past summer, and also on theoretical grounds. The low training of the grape has also been found favorable to the resistance of mildew, obviously on the same principle as before—that of shielding the soil, and thus preventing the effects of sudden atmospheric changes. Notwithstanding assertions to the contrary, the Isabella and Catawba are liable to mildew in bad seasons, though less so than foreign sorts.

Increasing attention is also given here to the culture of grapes in cold and hot vineries, and with good success. The fruit sells here in the autumn at from 9 to 15 cents per pound. Packed in thin layers, between bats of cotton, layers of dry maple leaves, or fine dry and sweet hay, they may be easily kept until mid-winter.

I have practised grafting the foreign grape on our hardy native

stocks. In this way we may have the second year a considerable, and in the third year a heavy, crop of grapes. This mode most strongly recommends itself to all families possessing thrifty vines of late maturity or inferior quality. I have practised grafting as soon as the soil is open in the spring, and also after the foliage is fully expanded; that is, about the 25th of June. Both methods are about equally successful, so far as it regards the immediate growth of the scion. The early season, however, is preferable in this climate, because the late period does not admit of the maturity of the young wood in case of an early autumnal frost. I wish I were able to report the foreign grapes as secure from mildew when grafted on hardy native sorts, as had been hoped. But why should such a result have been hoped for, when natives themselves are not always exempt? I must not forget to state that the German mode of extreme thinning out of the summer growth of wood, and often of leaves, will not do in our hot summers, not even when practised on foreign sorts. It robs the fruit of its elaborating machinery, and thus hinders the growth, and deteriorates the quality of the fruit. If the foliage of the grape be but well exposed to air and light, it is a matter of indifference whether the clusters ever see the sun or not. This, I think, is obvious on philosophical grounds, as well as verified in practice.

Statement of BENJAMIN SUMMERS, *of Vermilion, Erie county, Ohio.*

There are several vineyards in this county planted mainly with the Catawba and Isabella grapes. The blossoms are not apt to be injured by the frost, though one year they were killed twice, and put out a third set, producing a good crop. Where the vines are cultivated properly, and are not allowed to bear too full, the fruit is large, plump, and luscious, worth from $1 50 to $2 per bushel for table use; the product being from 75 to 100 bushels to the acre, and will make about 300 or 400 gallons of light wine, which is worth, when new, from 50 cents to $1 per gallon. I believe the pure juice has not sufficient body to keep without the addition of sugar or spirits, or boiling it away two or three to one.

The best districts for grape culture are the islands in Lake Erie and the lake-shore farms, where the proximity to the temperate water of the lake gives them a week or two longer to ripen than the frosts allow in the interior. From a slight personal acquaintance with Cincinnati and its vineyards, as well as a somewhat critical examination by our chief wine-maker, I cannot but think this is a much better grape county than that. Mr. Longworth, in his articles on grape culture, &c., about Cincinnati, admits that, owing to mildew and frosts, the crop there is very uncertain, though sufficiently sure to be profitable.

We put out our cuttings in beds one year, and transplant to the vineyard, in rows about six or eight feet apart, the next; training them to rails set in posts. The greatest difficulty is to get a heart sufficiently hard to thin out the young fruit. Some contend that nineteen-twentieths of the clusters should be taken off. I should think that rather too much, but I must acknowledge I have never taken off enough yet. Experience alone will enable one to do it right. One comparison I could not

avoid making in regard to the cost of cultivation, &c., at Cincinnati and here. There the land consists of hard, clayey hills, which have to be trenched and manured to the depth of two or three feet; at what cost I know not, but probably from $40 to $50 to the acre, in addition to its first outlay—say, from $200 to $300 per acre. Here the land needs no trenching, and but little manure; is worth only $40 or $50 per acre, and will produce two crops to their one. On the other hand, there they can command any number of cheap day-laborers when needed, which is very desirable in this business, and without which a vineyard will be very apt to suffer.

I am unable to make a statistical estimate of the cost of cultivating grapes; but from a little experience, and the information obtained from those more extensively engaged in it, I am satisfied it pays as well as any other agricultural pursuit, and perhaps better where the location is favorable. If we had as hardy and as prolific a grape as the Isabella, two or three weeks earlier in maturing, our whole county might become a wine-growing region; but with that and the Catawba only the most favorable localities can be successfully used for that purpose, both of them requiring the warm weather to be pretty well extended into October, in order fully to mature the fruit.

Statement of A. MARSHALL, *of Westchester, Chester county, Pennsylvania.*

For the last twenty years I have paid some attention to the grape culture. I commenced, as most others have done, by travelling in the beaten track of foreign cultivators. In this county, where my experiments have been made, and where I have watched with much interest the success of others, all attempts to cultivate the grape on a large scale have proved a failure.

The trials have generally been made on high ground, on hill-sides of various slopes and aspects. Imported vines from the wine countries of Europe were first tried, and soon abandoned. Native vines (Catawba and Isabella) were next tried with better success; but even the little encouragement afforded by these was soon given up. After bearing a few tolerably good crops, the vines would decline in health and die. In some locations the vines would cast their leaves in August, and the fruit, as a matter of course, could not mature. In other instances I have seen a single vine, growing against the north end or west side of a building, produce a large crop of well-ripened, delicious fruit; but even in these cases the vines were short-lived.

I am aware of the fact that in the vicinity of Cincinnati, on the Ohio river, the vine is cultivated with great success, yielding fair profits. In the neighborhood of Reading, in this State, on the Schuylkill river, the Catawba and Isabella grapes do well; also, in the neighborhood of Philadelphia, on the Delaware and the Schuylkill, the vine produces freely and ripens well. From these facts I draw this conclusion: that the grape-vine requires a moist atmosphere, and will not do well on dry hills remote from large bodies of water.

My object in this communication is not to give instructions for cultivation, but my views in relation to atmospheric influences on the vine, which may be useful in the choice of location.

Statement of H. R. Robey, *of Fredericksburg, Spotsylvania co., Va.*

The Catawba and Isabella are the only kinds of grapes grown extensively. The rot sometimes destroys a good part of the crop. Quite a number of families make wine in a small way—say from 20 to 100 gallons a year. One bushel of grapes will yield 4½ gallons of wine. If the grapes are all very ripe, no sugar is required; but if a part are a little green, one pound of good brown sugar to the gallon is as much as I have ever used. The grapes are bruised and put into a crib and pressed, as for cider; the juice is then put into a clean cask and allowed to ferment. In about a month the wine should be drawn off and put into another cask, and stopped tight. No brandy nor any kind of liquor should be put into the wine. A deep sandy soil suits the vine best.

THE SOUTHERN SYSTEM OF VINE CULTURE AND WINE-MAKING.

BY SIDNEY WELLER, OF BRINKLEYVILLE, NORTH CAROLINA.

About twenty years since, I settled as a farmer and vine-grower at my present residence. At first, an ardent friend of temperance, I was induced to turn my attention to the vineyard business, because learning from reliable information that in Eastern countries, where this species of culture is widely disseminated, little or no drunkenness prevails; and therefore, so far as the vineyard cause is promoted in our country, the horrid vice of intemperance would decrease.

The result of my vineyard enterprise and industry therein, is about a dozen acres of flourishing vines, mostly on scaffolding, or as canopies, covering continuously with branches (and when in bearing, with leaves and fruit) overhead, from 8 to 10 feet high, and nothing is seen between these canopies and the ground but main stems of the vines, and the posts or rock pillars to support the frame-work above. My annual yield of wine has been as high as 60 barrels; besides entertaining hundreds of visiters at 25 cents each entrance, and 50 cents per gallon for select grapes gathered to carry away. My vineyard is the largest, I learn, in the South, and I am encouraged to enlarge it every year.

To show that the Scuppernong is the "grape of grapes," South, (it does not do well north of latitude 37½°,) I may state that, at our late fair at Raleigh, I took diplomas on grapes and wines, and especially on the Scuppernong, as most highly commended by the judges. I exhibited Scuppernong grapes four inches in circumference, unparalleled in size; and no mean judges of wine, from different parts of the country, pronounced my "Scuppernong hock" the best of wine. I here digress, to state that, of half a dozen brands of the Scuppernong wine, I sell all readily, as soon as fit for market, from $1 to $6 per gallon.

As to cultivation, I would state that whatever diversity, in North Carolina or elsewhere, in the mode of culture of other grapes, there is only one uniform mode of success with the Scuppernong—the arbor or scaffolding method. I have heard repeated, and not unfrequently seen it inserted in books, that Scuppernong vines should never be trimmed.

This is a great mistake, for no young grape-vines need trimming more than the Scuppernong; for, if left to grow bushy, (as they always will if not trimmed,) they will not bear well, and soon will come to nothing. In the fall and summer, all the laterals of the young vines are to be removed, and one or two main stems only suffered to grow unchecked in length. But after the main stems are five or eight feet high, and branches thence spreading over the scaffolding, trimming is uncalled for. Some of the first planted of the Scuppernong part of my vineyard have not been trimmed nor manured at all for fifteen years, and every season they have produced abundantly, and grow better now than at the first of that period. Posts and scaffolding have had to be renewed and repaired occasionally.

According to my American system of vine culture, set forth years since in the old "American Farmer," I never curtail the length of a vine. Nature's process in keeping up and increasing fertility in woods and old piney fields, afforded me a most significant lesson as to sustaining the productiveness of my vineyards in the unchecked growth lengthwise. Therefore, I invariably scarify the ground underneath the canopies, before expected frosts, to cause the leaves to fall; and after they fall, to prevent their blowing away, or, by blowing off, to counteract the practical principle that the leaves and litter of any plant is the best manure, or equivalent therefor.

I plant other kinds of vines 10 feet apart each way; but the Scuppernong should never be planted, for a permanent stand in a vineyard, nearer than 20 feet each way, for the branches will eventually run 100 feet or more. Some of mine are 30 or 40 feet apart, locking and interlocking their branches on the canopies. So it may readily be conceived how one Scuppernong vine may, by right culture and management, eventually cover near a quarter of an acre of canopy, and produce five barrels of wine annually—a fact I know of in two instances.

The Scuppernong cannot be successfully cultivated by cuttings; but by grafting and layering, all desired success attends its propagation. The layers are made by burying freshly grown lateral branches in the spring and summer, with ends left out of ground; and, in the fall, the small-rooted plants are cut from the parent stock, planted in rows, and cultivated in the nursery a year or so, and they result in well-rooted plants for your own propagation, or for sale. I send hundreds yearly, mostly South, at the medium price of 25 cents each, and cuttings of all kinds at 4 cents each. I send, also, both wines and vines to Petersburg or Norfolk, Va., one place about 70, and the other about 100 miles distance, mostly by railroad—the cost of transportation from 25 to 50 cents per hundred weight. For distant places, I box casks of wine, as well as my other products, for market. And not only does boxing the casks prevent chances of abstraction, but the adulteration of the wine. In the corners of the boxes I put bottles of wine, as samples and presents. Most generally, my articles go safely thousands of miles, as first to Petersburg, thence direct to New Orleans, or by New York, and thence, say to St. Louis, or elsewhere.

Scuppernong and Muscadine grapes ripen for successive gatherings for nearly two months, and are collected for wine-making as follows: A large sheet of strong cloth, fastened to poles on two opposite sides,

is held by two persons, and a third shakes the canopy above the sheet with a forked stick. All the grapes then ripe fall and roll into the middle of the sheet. The grapes are mashed with a machine, consisting of two rollers, on a frame, placed over an open-headed hogshead, turned by handles, at opposite ends, by two persons, with a third one putting the grapes into a hopper above. After mashing, and no fermenting in the must, I press off in straw rings, as for cider; and folds of a woolen blanket put on a frame over the tub to receive the juice from the press and strain it, promotes the maturity of the wine by taking out the greater part of the extraneous matter that would have produced over-fermentation in the cask. Wine is made with spirits, only, as the safe-keeping, enriching ingredient—one-third or less added, according to the weather and state of the grapes as to dryness and maturity; and the mixture is put into a clean cask and well shaken, where it undergoes a gentle fermentation and natural clarifying, as indicated by the several quarts of lees found at the bottom of the barrel in two or three months, when the clear wine is drawn off for sale or use.

The Scuppernong champagne requires one bushel, say, of purple Scuppernong grapes, mashed with six or seven of the white or proper Scuppernong, and fermented in the must twenty-four hours or more, according to the heat of the weather. After pressing, as aforesaid, a fourth part of spirits and one pound of double-refined sugar per gallon are added, before turning or putting into the cask.

For Scuppernong hock the same process is pursued, with nothing more added than three pounds of double-refined sugar, with some additional trouble of racking, &c., to prevent the danger of acetous fermentation. Doubtless on the same principle, Mr. Longworth, of Cincinnati, distinguished for vineyard enterprise, sells his Catawba champagne so much higher than his wine, with no ingredient added. What I sell for purest Scuppernong, at $6 per gallon, is made with Scuppernong brandy, distilled from soured Scuppernong juice, and mixing a third part thereof with the juice of the same grape.

Having read of the fact, in the vineyard treatises of Hoare and others, that, through the discovery, by a French chemist, of some property in vine-leaves as in the fruit, good wine could be made of leaves only, I produced from Scuppernong leaves a wine that was pronounced by competent judges, at our late State fair, superior to foreign Port. My Scuppernong leaf, or Port wine, is made by steaming, say six bushels of leaves for a barrel, in a box made of oak plank, with a sheet-copper bottom, placed over a furnace. The juice or decoction, as the result of such steaming, is mixed with one-third spirits, and from one to two pounds of sugar per gallon. In a similar manner, as stated in the vineyard treatise of Mr. Adlum, the pioneer of the vineyard enterprise in our country, I make good wine of Scuppernong and other green grapes by adding an extra quantity of pure ingredients, as sugar and spirits.

As to the cost of making wine, I would state that on a farm of about 400 acres, and a comparatively small proportion in vineyard and nursery, and other tillage, I have, on an average, about half a dozen good hands, at the cost of about $50 per annum and their board and clothing. These hands are alternately employed on the farm ground proper, or in the nursery or vineyard, according to circumstances; but

in the midst of the vintage season, for several weeks, I employ about half a dozen extra hands, at 25 cents per day, with a premium of two cents per bushel for all the grapes they gather.

The result of our joint labors, so far as ascertained, is 500 bushels of corn, 2,000 pounds of cotton, 300 bushels of sweet potatoes, some 20 stacks of hay and fodder, and about 40 barrels of wine. From all sources of income during the grape season, as that of entrance fees for pic-nics, grapes sold, &c., I calculate that the receipts are in the neighborhood of $200. I will further state, that an enterprising lady, a near neighbor, three years since, made at my presses 10 barrels of Scuppernong wine, from a small vineyard of less than half an acre, set out from my nursery about ten years previous; thus realizing, with very little labor, in a slack time for farming here, just after what is called laying by corn, at least $250 for wine. Another lady, living near me, makes two barrels of wine annually, from two Scuppernong vines which I planted about a dozen years since, directing her to train the branches to and over some oak-trees in her grounds. The vines now overspread the trees instead of scaffolding, and afford an abundance of the best of fruit for weeks, besides the two barrels of wine, worth at least $50.

From the foregoing statements it is obvious that, with materials for insuring a strong body and safe-keeping, of American origin and manufacture, as good native wines can be made as those from the East, and especially when confidence can be instilled in the minds of our countrymen that these wines contain no impure or deleterious ingredients, like those palmed off by dishonest or ignorant salesmen as genuine Madeira or European Port. Let any of our American wines be duly generous with safe-keeping and enriching ingredients, my word and experience or it, as good wine as any from the East will be the result.

THE WINE CROP OF THE WEST.

[From the Cincinnati Columbian.]

The grape culture, the grape and wine interests of our community, are fraught with very considerable importance now, and must eventually become a great and absorbing feature of the State's property. Fields of waving corn or golden-tasseled wheat are fair to the view; but picture to yourself the vast vineyards that shall anon deck the hill and dale with gorgeous and tempting, voluptuously rich, red, ripe Isabellas or Catawbas.

The third year after planting the slips, the production of wine may be commenced from the fruit. There is more expense and labor in commencing the cultivation of the vines, than is probably attendant upon the planting of the usual crops, but less afterwards. From one acre, well planted with healthy vines, probably from $600 to $1,000 worth of wine may be produced in good seasons. This wine has generally brought $1 per gallon here, but this year will probably bring $1 25.

Nothwithstanding the immense annual increase of the quantity of

wine manufactured in the West, the price continues to improve, and it must do so as the wine becomes more generally known. This year, notwithstanding the increase, the price has raised nearly 25 per cent., and the demand for wine is much greater than last year. So must this demand continue increasing. The crop this season has been very fruitful, surpassing, in fact, any former yield known in the West. The wine will be very pure, and the demand great.

In Ohio there are about 1,500 acres of land exclusively devoted to grape-growing, between 300 and 400 of which are near Cincinnati. Within twenty miles of this city, including a part of Kentucky, on the opposite side of the river, there are 1,300 acres, and double that quantity of vines. More have been planted this year than there were last. In Missouri, near Hermann, there are 500 acres; in Indiana, 200 or 300; in Illinois, about 100; and in Kentucky the same—making about 2,500 acres in all. It is estimated that Indiana, Ohio, and Kentucky will this year produce at least half a million gallons of wine. The yield on some of the vineyards will be equal to 7,000 or 8,000 gallons—allowing 2,400 vines to the acre, planted about three feet apart, in rows separated by a distance of three feet. Mr. Robert Buchanan, who is among the most successful cultivators of the vine, this year obtains about 800 gallons of wine from each acre of his vineyard, which will net him about $700 per acre. Some other vineyards will do equally well. Persons, however, are not advised to embark in grape-growing with the expectation of profit, if it shall be necessary to hire labor. The German vine-dressers muster all capable members of their family into the service—the wife often being the most efficient. In this manner they realize an adequate income.

It has been customary to give a piece of land, of say fifteen to twenty acres, with a house on it, to those Germans, on the condition that the tenant shall plant a certain quantity of grapes each year, in a proper manner, and pay the proprietor one-half the proceeds of the vineyard.

The fruit is purchased from the vineyard men for from $5 to $6 per 100 pounds, (or two bushels,) a bushel yielding from 3½ to 4 gallons of wine. It is then mashed by the manufacturers in the city and pressed. The juice is then fermented in the cellars, and the sparkling Catawba is in prime order for market at the end of fifteen or twenty months.

A few days ago we visited the wine-vaults of Mr. Longworth, and the following facts were derived: There are three vaults, one of which will turn out 50,000 bottles every year, and another 100,000 bottles yearly, of dry wine. Some portion of the cellars is occupied by immense butts, or cylindrical tanks, one of which holds 5,000 gallons, or $5,000 worth of wine if bottled. The staves are about three inches in thickness, and the heads curve inward, so as to introduce the arch, to resist the internal pressure. Other objects, quite as noticeable, are the long rows of black bottles placed in a horizontal position, and stacked up like cord-wood, in solid piles, as high as one's neck. In the cellars of the extensive native-wine establishment of Longworth & Zimmerman are twenty-four casks, holding about 2,500 gallons each, or 60,000 gallons altogether, of the vintage of 1850–51–52, and it is expected to store 25,000 gallons of this year's wine.

Mr. Longworth will this year have on hand and for sale about 200,000

bottles of sparkling Catawba; Messrs. Longworth & Zimmerman some 60,000 bottles of dry Catawba, exclusive of a quantity of wine sufficient for 190,000 bottles; Messrs. Bogen, Cornew & Son, Work, and others, from 90,000 to 100,000 bottles of Catawba.

Mr. Zimmerman tendered us various samples of the present and past years' wines; and as far as our judgment in the matter stands, the purity and flavor of the vintage of 1853 will prove the finest specimen of Catawba yet bottled in the country.

THE GRAPE DISEASE IN EUROPE.

For two years past, a disease of a serious nature has attacked the grape-vine throughout Portugal, and a similar malady has also made its appearance on the vine in other parts of Europe, as well as at Madeira and Teneriffe. The following communication from Nicholas Pike, esq., United States consul at Oporto, to the State Department, will throw some light upon the subject:

UNITED STATES CONSULATE FOR PORTUGAL,
Office of Oporto, January 1, 1854.

SIR: In my last despatch I mentioned to you that a disease of a serious nature had made its appearance on the grape-vine throughout this kingdom. Since that period I have carefully examined and watched the progress of the disease. Soon after the grape begins to form, a minute parasite makes its appearance, completely covering the fruit with a close network, as indicated by the adjoining cut of a magnified grape. It increases with the growth of the fruit, until it is perceptible to the naked eye, extending to the leaves, and often covering the whole vine. In many instances, I have noticed only one cluster affected; but on close examination, with the highest power of my microscope, I have always discerned the parasite. It appears to be a flocculent fungus, unknown to me, and, I believe, new to naturalists. After the grape has arrived to its full growth, and just before it changes its color, it bursts open, showing the two pits, as denoted by the following figure, and immediately dries up.

I have seen whole vineyards in the vicinity of "San Cosme" and "Campanham," near Oporto, with the grape in this condition, having the appearance of being dried by a scorching sun. Many of the farmers in the vicinity, who made from 20 to 30 pipes of "green wine"

in former years, have not been able to produce more than five pipes the last vintage, and then by carefully picking the fruit which had not the appearance of disease to the naked eye. I have discovered the fungus on the fairest and best fruit, which has been carefully selected by myself for examination. Wine made from grapes of this vintage, in my opinion, is not wholesome. Many cases have come under my observation of sickness to the stomach and vomiting, after eating the fruit that is diseased.

Wine merchants are afraid to mix it with other wines, and large quantities are used for "lodge" purposes, such as seasoning casks, &c.

I have lately examined cross-cuttings of different parts of the vine, and have discovered that each joint of the new wood of last year's growth is already commencing to decay; and a correspondent of the Upper Douro informs me that many of the vines have begun to decay in the wine district.

In 1852, about 80,000 pipes of wine were produced in the Upper Douro. Last year, not more than one-half the amount has been produced. Brandies and wines have advanced in price 100 per cent., and are still advancing. Merchants and holders here refuse to sell, as a total failure is looked for in the vine next year.

In my examination of various vines, such as the squash, pumpkin, cucumber, and other kinds, I have always discovered the same fungus that infests the grape. The olive-trees are also attacked with the same disease; and last year, the quantity of oil was about two-thirds the quantity usually produced.

As wine and oil are the two principal products of this country, the consequences of a failure of them will be a great calamity.

I am, sir, your obedient servant,

NICHOLAS PIKE.

Hon. Wm. L. Marcy,
Secretary of State, Washington, D. C.

Note.—At present we know little concerning the origin or production of that class of fungi known by the name of "blights;" but as far as investigation has proceeded, it is found that the minute fibre called *mycelium* corresponds with the office of plant, and the fungus the development, the spores of which contain the sporules, which are analogous to the seeds of vegetables, as regards reproduction, and which are so minute as to baffle investigation by assistance even of the most powerful magnifiers. These sporules are disseminated throughout the atmosphere, or remain inert, or in a state of inaction, until the period arrives when certain conditions of the atmosphere, soil, and other circumstances, conspire to their development. What is called "mould" comes under this denomination, and every vegetable substance is more or less subject to this *oidium*. It is to be found upon almost every substance while entering into a state of decomposition, which it greatly facilitates; and even may be seen in great perfection upon sour paste or bread, in summer, and, under different forms, upon vegetables in their growing state.

The parasitic fungus with which the vine is affected, appears first as

a small blotch upon the surface of a leaf, and then spreads so rapidly, that in the space of a few days every branch and leaf is covered with minute spores, as thickly as if lime or flour had been carefully dusted over their entire surface, whilst the fruit is covered as entirely as if first moistened and then dipped into those substances. With millions as cyphers to define number, and computation to infinity for their enumeration, the human intellect is still left behind in the attempt to convey to the minds of others their number and extent. Yet each of these individual atoms is a spore, or seed-vessel, containing thousands of sporules, all endowed with vegetable vitality; each of which is capable of reproducing its species, whether taken up by the atmosphere, or returned to the soil to remain quiescent until a combination of circumstances concur to bring them into active life. Imagine a quantity of potatoes strewed indiscriminately over the space of an acre of land, and every potato throwing out a radicle, or shoot, exactly in the direction of each potato nearest to it, and those to others next in succession to them, and so on over the whole surface, until the whole intervening space is filled in with these shoots, you will then have an idea (a magnified one) of what is progressing upon every portion of the leaf of a vine infected by these destructive agents; every pore of every leaf becomes penetrated, until every portion of the vegetable sap is extracted, and the plant withers and dies by exhaustion alone.

Sulphur, applied to the vine, as well as to peach-trees, with a little attention in the early stage of its appearance, will entirely subdue the blight. The flour of sulphur may be put into a piece of muslin or "cheese-cloth," immersed in water, and well worked with the hands. The water may then be applied to the vines by means of a syringe, first striking the under side of the leaves, and afterwards the upper. A second washing will sometimes be necessary to complete the cure.

D. J. B.

THE STRAWBERRY.

When we contemplate the relations which the strawberry-plant bears to other parts of nature—to the sun which expands its blossom—to the winds which sow its seeds—to the brooks whose banks it embellishes—when we contemplate how it is preserved during a winter's cold capable of cleaving stones—how it appears verdant in the spring without any pains employed to preserve it from frost and snow—how, feeble and trailing along the ground, it should be able to migrate from the deepest valleys to Alpine heights—to traverse the globe from north to south, from mountain to mountain, forming, on its passage over prairie and plain, a thousand mingled patches of chequered work of its fair flowers and scarlet or rose-colored fruit, with the plants of every clime—how it has been able to scatter itself from the mountains of Cashmere to Archangel, from Kamtschatka to Spain—how, in a word, we find it in equal abundance on the continent of America, from the bleak fields of Tierra del Fuego to Oregon and Hudson's bay, though myriads of animals are

making incessant and universal havoc upon it, yet no gardener is necessary to sow it again—we are struck with wonder and admiration at so precious a gift.

The strawberry appears to have been disregarded by the ancients as a fruit-bearing plant. Virgil, Ovid, and Pliny, but lightly speak of it, though the latter particularly mentions the raspberry as an article of medicine, luxury, and diet. The strawberry was described by Joan. di Cuba, in his "Ortus Sanitatis," in 1485, in which its medical and other properties are treated of at length. It was also in some repute in England in the time of Tusser and Shakspeare, and is noticed in their works.

CONDENSED CORRESPONDENCE.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

Nowhere in the world, perhaps, can the strawberry be produced in greater abundance, and in better perfection, with the same attention, than with us. The Early Scarlet, and some of the Pines, are the most prolific. Mammoth, McAvoy's Superior, and Longworth's Prolific, are good varieties.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine.*

Strawberries grow wild in our fields in great abundance, and are mostly used for preserves. Among the cultivated varieties are Hovey's Seedling, Early Virginia, Jenny's Seedling, and Boston Pine. The White Wood is the most common variety, as it is hardy and very productive. We have also Burr's New Pine on trial.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Strawberries are quite commonly cultivated by private gentlemen, who make very fine displays of this fruit at our occasional city fairs. But the public supply is mostly from the fields, where they are gathered growing spontaneously. My remarks on the raspberry are even more applicable to the cultivation of the strawberry.

THE STRAWBERRY AND ITS CULTURE.

BY CHARLES A. PEABODY, OF COLUMBUS, GEORGIA.

That eminent horticulturists are liable to be mistaken in their views of culture, as well as of the origin and history of plants, as any other class of men, we have ample proof in the conflicting opinions of the nature and culture of the strawberry. Downing says: "The straw-

berry is the most delicious and most wholesome of all berries, and the most universally cultivated in all gardens of a northern climate." Again he says: "The strawberry properly belongs to cold climates, and though well known, is of comparatively little value in the south of Europe." With this high authority, the horticulturists of the South never dreamed of cultivating the strawberry to any extent, although the woods and fields were covered with the wild fruit. It was a knowledge of the fact that the wild strawberry grew all around me, that induced me to try strawberry culture at the South. I do not believe there is a plant in nature that so easily adapts itself to soil, situation, and climate, as the strawberry. In many of its homes, however, it produces little or no fruit, spreading itself rapidly by its runners.

Now, as there are two ways of propagating the strawberry, one by its seeds and the other by its runners, the question is, which method do we prefer? If we were going to introduce the strawberry-leaf for a tea, for which it makes a good substitute, common sense would dictate to us to cultivate for runners, and stop the fruiting, or perfecting the seed, as the fruit is nothing more than the receptacle for the seed; and if, on the other hand, we wish seeds or fruit, we must cultivate for that purpose alone, and stop the runners.

Intelligent experimental cultivators have long since discovered that plants have a specific food for their wood, leaves, and fruit. Physiologists know full well that it takes different substances to form the bones, flesh, and muscles of animals; and profiting by these hints in nature, I would feed for fruit instead of vines. Before planting out the vines, the cultivator should understand the sexual character of the plants, as upon a proper knowledge of this fact will depend his whole success in culture. That plants are staminate and pistillate, or male and female, no intelligent cultivator will now presume to deny. But in the strawberry there are three varieties—the perfect male, the perfect female, and the hermaphrodite. The perfect pistillate, or female, is the most productive of the three, when impregnated by one of the other kinds. The perfect staminate, or male, produces no fruit, making a great show of flowers, and sending out innumerable runners, which will soon take possession of the whole bed. The hermaphrodite produces fruit, but not in so great abundance as the pistillate, and answers the purpose of an impregnator equally as well as the purely staminate. These three varieties of flowers are represented by figs. 1, 2, and 3, Plate I.

Fig. 1 is from a hermaphrodite plant, which blooms and impregnates itself. The stamens marked *a*, are full of a fine pollen, or yellow powder, which falling on the end of the unopened calyx of the buds, below the flower, or around it, on the pistillate plants, is carried by an unseen agency direct to the pistil, impregnating and setting the fruit. This variety is the Early Scarlet, a continuous bloomer with my culture, and the best impregnator for the ever-bearing Hovey Seedling I have ever met.

Fig. 2 is the sterile staminate, or male plant, never producing fruit under any circumstances whatever. It will be observed the flower is larger and more showy than the others. It deceives many an inexperienced cultivator with its false promises of fruit. The flower of the

pure male may be easily known by its large anthers and stamens, as marked *a*, *b*, in Fig. 2.

Fig. 3 is the pistillate or female blossom. It will be observed that there are no stamens around the pistil, as *b*, but nearly every bud will produce a berry if impregnated by one of the staminate or hermaphrodite plants. Of this variety is the Hovey Seedling, which, as far as my experience goes, is the best strawberry ever yet cultivated North or South. This, and the Early Scarlet, as they appear in Plates II and III, are a fair sample of the fruit they produce at the South, at least six months in the year; and I see no reason why, with the same culture, they may not bear at the North four months in the year. It will be observed that these plants are in full and perfect fruit; and at the ground marked *o*, is the new germ of another fruit-stem, which will be in bloom and fruit by the time the older fruit is gone; and thus it will continue through the most of the year, if the runners are kept down, and the plants cultivated as hereafter described.

Before proceeding to the method of culture, I will give my views of the time of impregnation, being fully satisfied that the generally received opinion that the strawberry is impregnated after the petals expand, is entirely erroneous. I have long since observed that the first strawberry blossoms never produce fruit. The staminate varieties, or rather the hermaphrodite, open from two to ten blossoms, which must shed their pollen on the ends of the unopen calyx of the young buds below, or fall on the ends of the unopened pistillate buds, and immediately cause impregnation.

Fig. 5 is a sketch of a staminate variety, just as it buds and blooms, with two flowers fully expanded. The stamens and anthers are plainly perceptible, the anthers being loaded with pollen, and may have impregnated many a bud around them; but neither of these flowers can produce a berry, once having opened their petals without impregnation.

Fig. 4 is the pistillate variety, an exact copy from nature. The flower *b* will be seen fully expanded, but can never make a fruit. The unopened buds, *a*, *a*, below it, may all be made to fruit, if the pollen from the staminate flowers *c*, *c*, fig. 5, fall upon their ends before expanded.

The pollen of flowers is one of the most volatile substances in nature. That of the strawberry, viewed through a microscope, is a hairy substance, which, upon ripening, bursts and floats off on the least breath of air. The point of the unopened calyx, marked *d*, fig. 4, contains a glutinous matter, which catches and holds this hairy pollen, and the work of impregnation is done; and when the calyx opens, and the petals expand, the young strawberry may be seen perfectly formed. From this will be seen the importance of the pistillate and staminate varieties blooming together. I would always prefer the pistillate plant for a large fruit crop; for, if properly impregnated, nearly every bud will be a berry. Thousands of blossoms will be found in the beds to correspond with figures 2 and 3. Fig. 2, let it be recollected, is a staminate or male flower, and fig. 3 an impregnated pistillate or female flower, neither of which, by itself, can ever make fruit.

Having now explained the sexual character of the plant, and the time of impregnation, I will proceed to the culture. As I have before

stated, were I to cultivate for vines alone, I would stimulate the plants by the most active fertilizers; but if fruit be the object, the luxuriance of the vine must be curtailed; and that food only, known as the special food of the fruit, given. Now, as to soils. There are as many opinions as cultivators, from the fact that the strawberry adapts itself to almost any kind of soil. But the soil which I have found to suit them best, is a sandy loam. I would prefer new land for the beds, with a stream of water running through them, as water, being an indispensable requisite, should be in the vicinity.

It is now well known throughout the Southern States that for many years I have cultivated the strawberry extensively, and have had from my beds a constant succession of fruit six months in the year, and frequently have it ten. While I am now writing, (December 24,) one of my beds, of an acre, is loaded with ripe fruit, specimens of which I have sent to New Orleans, Montgomery, Savannah, Charleston, Mobile, and New York. This bed has scarcely produced a runner the past season. The causes of this will be found in my method of culture. I have said that I prefer a sandy soil and new land. My grounds are on what is called "piney wood lands," hill and valley, with never-failing streams meandering through them. I have taken the grounds bordering on the streams, ploughed them deep, and laid them off in rows, two feet apart, and planted as indicated in the annexed diagram:

*	*	*	*	*	*	*	*....Early Scarlet
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
*	*	*	*	*	*	*	*....Early Scarlet.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
+	+	+	+	+	+	+	+....Hovey's.
*	*	*	*	*	*	*	*....Early Scarlet.

I plant the pistillate for fruit, and the hermaphrodite for impregnators; and the only two which I have found to bloom and fruit together the whole season are the Hovey Seedling and large Early Scarlet. Ross Phenix, Burr's New Pine, and a seedling of my own, not yet fully tested, I have also caused to bear continuously. I plant seven rows of the pistillate, and one row of the hermaphrodite, two feet apart each way. The first season I let the runners fill the ground; in the fall, go through the grounds with hoes, thinning out to 8 or 10 inches, leaving the vines to decay just where they are cut up. I then cover the whole bed with partially decomposed leaves from the woods or swamps. The winter-rains beat down the leaves, the fruit-germ finds its way through them, and the first mild weather of spring the blossoms appear.

I have before spoken of the volatile nature of the pollen. In very dry weather the particles float off on the winds, and much is lost to the buds below; hence the importance of watering freely when in bloom. Free applications of water will set the whole bed with fruit, which will require continuous watering to swell and ripen it. A strawberry bed may be moist, the plants in fine condition, and yet one good shower will make a difference of one-third in the quantity of fruit picked the day after. Consequently, in dry seasons, artificial watering must be resorted to, and no labor will pay better.

I never use animal manure of any kind—nothing but the leaf-mould, and an occasional sprinkling of wood-ashes. The leaf-mould keeps the ground cool and moist, as well as the fruit clean, and does not stimulate the vines to runners. The potash and acids contained in it is just what the fruit wants. Should the vines be disposed to spread, keep the runners down by constant pinching off, and clear out the grass and weeds with the hoe. A few years of this culture will check their disposition to run, and encourage them to fruit. The bed once thus formed and cultivated, will, to my certain knowledge, continue productive twelve years, and, I have reason to believe, as much longer as the culture is continued. Should the vines have taken possession of the ground, in spite of the efforts to keep the runners down, we go through in the fall with the hoe, thinning out the plants to 10 or 12 inches, leaving every cut up vine to decay on the ground where it grew; we then cover with the decaying leaves. When the plants begin to bloom in the spring, a top-dressing of wood-ashes will be found beneficial. I have tried strawberry culture with the plough, which will make a greater quantity of vines, but will give only one crop of fruit. It is generally remarked that the wild strawberry is finer flavored than the cultivated; but with this treatment the latter retains all the original flavor.

It has been recommended by some cultivators to irrigate the strawberry grounds by letting water on the vines; but the strawberry cultivated after the manner described, can bear as great a drought as any other plant. It is not the vines and leaves that want the water, but the flowers and fruit; and the water must come in the form of rain, through the clouds, from an engine, or a common watering-pot.

I have noticed quite a contest going on among horticulturists as to the possibility of strawberries changing their sexual character by cultivation. Without taking part in the controversy, I must state that I would as soon think of high feed turning a cow to a bull, as to change

the pistillate character of Hovey's Seedling by any method of cultivation. I have cultivated the strawberry under every aspect; with high manuring, and without manure; in new lands, and on old lands; have had the vines stand from 12 to 18 inches high, and in meek submission to hug the ground; yet I have never found the least change in the blossom. A perfect pistillate or staminate flower, first blooming so from seed, will never bloom any other way. Cultivators are often deceived about their plants, from the fact that they frequently find varieties in the beds which they did not plant; but these spring from seed. The strawberry springs from seed with astonishing rapidity. Since my beds were started, the whole country around me is covered with strawberry-plants from the seed dropped by birds. These I find running into all varieties—pistillate, staminate, and hermaphrodite—most of them worthless, but some with good fruit.

The proper time for transplanting the strawberry at the South, is as soon in the fall as the weather is cool and moist enough. Here, this may be continued until spring. Plants are easily transported great distances in the winter. I have sent them 2,000 miles with safety. It will be observed by the diagram, that I plant the staminate every eighth row. Some cultivators mix in the rows; but I prefer to keep them separate and distinct, as they are more easily distinguished, and kept better in their places.

Now, if the cultivator would know the secret of my having strawberries six, eight, and even ten months in the year, in the hot climate of Georgia and Alabama, it is this: proper location, vegetable manures, shade to the ground, without exhaustion, and water to the bloom and fruit.

Plates II and III are exact copies of fruit as ripening in my grounds in March, April, May, June, July, and August. Later than this it falls off in size, but not in quality. Thus it will be seen that high culture makes vines, whilst my simple, plain method makes fruit. One reason why so many fail in garden culture with the strawberry is, that the beds are surrounded by trees and shrubbery, which may produce one crop of fruit in the spring, but rarely more than that, unless it should prove a very wet season. The strawberry-bed, whether in the garden or the field, should have no tree, plant, or shrub near enough to it to take the moisture from the earth. The plants require all the moisture from the atmosphere and the earth around them. Whether the strawberry was originally found in cold climates, or not, I find they readily adapt themselves to any climate, and very soon become indigenous. I doubt whether there is a State in this Union that cannot produce the strawberry months, instead of weeks in the year, with proper culture. And when we take into consideration the ease and simplicity of its culture, its continued bearing and productiveness, its exemption from all insect depredations, its delicious flavor and healthy influence upon the system, it ranks first in importance among the fruits of the earth.

THE RASPBERRY.

The common cultivated raspberry is found wild in the agricultural and sub-alpine regions, and in the woods and moist wastes of almost every part of Europe, as well as in Northern Africa, the Himalayas, and in North America, from Pennsylvania to Hudson's bay. Its properties and uses were well understood by the ancient Greeks and Romans; and it has been described by various authors down to the present time. In a state of cultivation, like most of our garden or orchard fruits, it presents several varieties, particularly in the size and complexion of the berries. The roots belong to that description which is called "trailing;" that is, the suckers extend themselves all round the central plant, so as every year to come up in a fresh soil. Hence a raspberry plantation requires to be frequently taken up and replanted—every five or six years. The raspberry, for this reason, has been considered as a good example of the doctrine of the "excretion of plants," first broached in detail by De Candolle, and subsequently elucidated by various experiments by M. Macaire.

CONDENSED CORRESPONDENCE.

Statement of MICAJAH BURNETT, *of the United Society of Shakers, Pleasant Hill, Mercer county, Kentucky.*

The Fastolf, genuine red Antwerp, and the Franconia raspberries, are very fine, and give satisfaction, except that they are too tender to stand the winter without protection. The Monthly or ever-bearing, Red English, Spurious Antwerp, Yellow English, and Pine-apple, bear well, and are hardy enough to stand the winter. Knevel's Giant is an excellent variety, and from the short trial we have made of it, we believe it to be a hardy one.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine.*

Raspberries grow wild in abundance. Several tons are annually sold in this market. Fastolf, Franconia, and Knevel's Giant, are the best cultivated varieties.

Statement of CHAUNCEY F. GOODRICH, *of Utica, Oneida county, New York.*

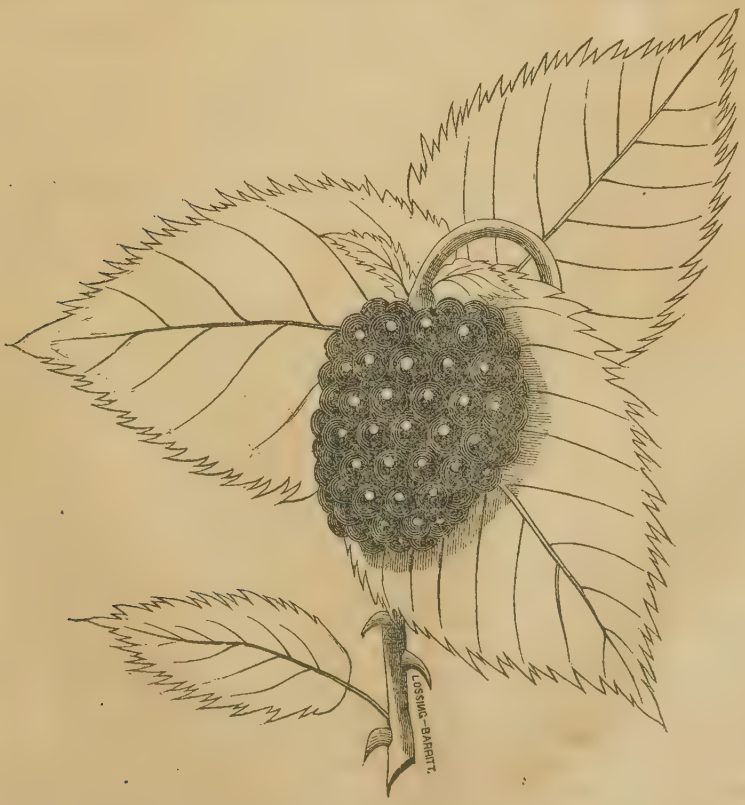
Raspberries are extensively cultivated in the gardens of private gentlemen. But while so many broad margins remain about the fields of our careless farmers, and while in rough localities about us so much waste land exists, there will be no lack of space for them to grow spontaneously. The wild fruit is considered by many superior in flavor to the cultivated. Thus situated, it will be a long time before they can be profitably cultivated by the market gardener.

BLACKBERRIES.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM LAWTON, *of New Rochelle, Westchester county, New York.*

For several years, a new variety has been cultivated in small quantities in this town, which, for the want of a better name, I beg leave to introduce into notice as the "New Rochelle blackberry." I have not been able to ascertain who first discovered the plant, and brought it into garden culture; but am informed that it was found on the roadside, and from thence introduced into the neighboring gardens. I have examined many works with a view to ascertain if there has ever been any improvement on the well known wild varieties, but without success. The "Double-flowering," "Dwarf" or "Dewberry "American Upright," and the "White-fruited," are all that are named. The Dewberry is the first to ripen, and the best-flavored fruit. The White-fruited seems to be cultivated as a novelty, more than for the fruit. The Upright variety fruits late in the season, is of vigorous growth, and under favorable circumstances, produces large mulberry-



shaped berries; but the seeds are not thickly bedded in the pulp, and are so abundant as to impair materially the quality of the fruit.

From the many millions of plants which spring up from seeds, annually distributed in almost every diversity of climate and soil, we should constantly find new varieties; but this plant seems to adhere to its original character with singular tenacity. Improving the wild plant by careful cultivation, is one thing; to produce a new variety, is another. The fruit now before me I believe to be of the last-named character. It is not like the Dewberry, nor long and mulberry-shaped like the Upright blackberry, and the seeds are so completely imbedded in a rich pulp as hardly to be noticed. I think in shape and size it compares very well with the Hovey Seedling strawberry.

The "New Rochelle blackberry" sends up annually large and vigorous upright shoots, with lateral branches; all of which, under common cultivation, will be crowded with fine fruit, a portion of them ripening daily in moist seasons for six weeks. My plants have ripened from the 20th of July until the 15th of August. They are perfectly hardy, always thrifty and productive, and I have not found them liable to blight, or injury by insects.

It will be many years before our citizens generally will be able to procure this fine fruit, as our large hotels and saloons will contract at high prices for all that can be sent to market. But numerous private gardens may be stocked for family use in three or four years, and in their turn aid in the distribution. Except that they are perfectly hardy, and need no protection in winter, the cultivation may be the same as the Antwerp raspberry; but to produce berries of the largest size, they should have a heavy, damp soil and shade.

CURRANTS AND GOOSEBERRIES.

These wholesome and agreeable fruits do not appear to have been known with certainty to the ancient Greeks and Romans, as considerable confusion exists among the writers in the names of many of their plants. The *Isos* or *Oesos* of the Greeks, and the *Vua crispa*, *Vua marina*, and *Vitis precia* of the Romans, doubtless referred to one or both of these fruits, as several of their characteristics are clearly described.

The gooseberry is found wild in various parts of Britain and other places in Europe; and, on the authority of Dr. Royle, it is indigenous to Nepal.

The red currant, it would seem, was unknown to the Romans, as the French, Spaniards, Portuguese, and Italians, fifty years ago, had for it no appropriate name. The old French name, *groseilles d'outre mer*, and the Dutch appellation, *Beskins over Zee*, would imply that they came from abroad. Moreover, Joan. di Cuba, a Dutch botanist, who travelled through Greece and several countries in the East, states in his "Ortus Sanitatis," published in 1485, that this shrub grew wild on the snowy mountains of Syria, and quotes several authors as to the medical properties and use of the fruit. Among other things of interest he speaks of currant jelly, or "rob."

CONDENSED CORRESPONDENCE.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Gooseberries grow here freely. The requisites for successful culture are a deep rich soil, and extreme pruning, so as to leave the foliage open to the sun and air. Mildew is almost the only drawback to successful culture. I have found its prevention both cheap and easy. It is by thickly sifting fresh warm ashes over the foliage when the flowers first appear in the spring, and again in six or eight days. One application is often effectual, though it is safer to make two. The alkali of the ashes probably prevents the action of some minute insect, or the permeation of fungus, by the one or the other of which suppositions the mildew is to be accounted for. This alkali also becomes a needful aliment to the plant. An ordinary wire seive is the best instrument for applying the ashes. The morning, when the dew is on the bark, is the best season. Careless cultivators may lose all their pains with the gooseberry by neglecting this application at the proper time. The usual price of this fruit is from 6 to 10 cents per quart, when picked green, as it usually is.

Statement of HENRY LITTLE, *of Bangor, Penobscot county, Maine.*

Currants are found in every garden. Those mostly used are:

White Dutch,	Knight's Large Red,
Red Dutch,	Knight's Sweet Red,
White Grape,	May's Victoria, (red)
Cherry, (red)	Black Naples, (large.)

The gooseberry thrives well in this State, and is cultivated by many somewhat extensively. It has been imported in large quantities from England, and grows to a very large size. It is not so liable to mildew here as in most other sections. It seems to be designed by nature for a northern climate. I imported to this city the following varieties, which are now cultivated: Red Warrington; Crown Bob; Whitesmith; Green Walnut; Red Champagne; Yellow Champagne; Early Green Hairy; Heart of Oak; Keen's Seedling; Green Gage; White Honey; Rifleman; Bright Venus; Early Sulphur; Yellow Ball; Smiling Beauty; Green Laurel; Lord Crew; Jolly Tar; Large Early White; Sheba Queen; Wellington's Glory; and White Lion.

All the above I consider very good; but there is an American hybrid sort called "Houghton's Seedling," which I prefer to any of the imported varieties, although it has a small berry, but is an immense bearer, uniting more good qualities than any other within my knowledge. I never knew it to mildew in any location. It is very easily multiplied by layers or cuttings—more so than any other.

I have just received a letter from Joseph P. Sinclair, of Levant, near this city, in which he states as follows: "I received at your garden in

the spring of 1848, a gooseberry plant, 'Houghton's Seedling.' In the spring of 1850, I took from the standard bush 24 well-rooted layers; in 1851, 100 layers; in 1852, 300 more; and in 1853, 650 layers. I now have on hand, one year old and new layers, over 1,000 plants well-rooted. I have sold for cash, since 1851, over $50 worth, and have had a good supply of the berry annually." The "Houghton gooseberry" is a great and constant bearer, and does not mildew. The fruit of this variety, when ripe, is extra fine.

CRANBERRIES.

CONDENSED CORRESPONDENCE.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

Cranberries have not been cultivated here with any encouraging success. In the spring of 1850, I procured plants from the south shore of Long Island, and with much difficulty raised plants from the seeds of the ordinary fruit sold in market. Plants derived from both these sources were cultivated on swamp muck, moderately drained, on swamp clay that was usually moist, and on moist sand on a springy hill-side. They grew well in all these localities, and fruited, except the clay, from which they were removed too early—that is, before the bearing season in the second year. The cost of cultivation, however, forbids its continuation on the score of economy; for so delicate is the plant, and so great the difficulty of rearing it, that the cultivator is discouraged. The assertion that the cranberry once planted in soil divested of its bushes and large herbage will take undisputed possession of the soil, is not true in my experience, although there doubtless exist lands so poor that such a result would follow.

There are at least two localities in this county where the cranberry grows spontaneously, on swamp lands, in small quantities. Much, probably, might be done to improve wet or humid situations by cutting out brush and coarse grass, and by graduating the flow of water. The latter might in many cases be accomplished by artificial sluices at the outlets of swamps. In future years, when our population shall have greatly increased, and our wild lands proportionally decreased in quantity, such modes will doubtless be resorted to. Whether search in natural localities and reproduction from seed will ever bring to light new varieties, adapted by constitution to at least a dry soil, and fitted by strong and somewhat upright herbage to cultivation with the hoe, I cannot say. Report did indeed speak of such discoveries a few years ago; but I have never seen the proof. The whole range of vegetation scarcely affords the parallel of a vegetable so humble in appearance, and producing in many natural localities, spontaneously and abundantly,

a fruit at once so worthless as a nutriment, and yet so pleasantly contributing to human comfort, as the cranberry. Its more general and cheap culture ought certainly to command the attention of shrewd men.

MELONS.

The history of the *watermelon*, so much esteemed for its sweet, delicious, and cooling juice, as well as that of the *muskmelon*, or *canteleup*, which is equally prized for its rich aromatic pulp, may be traced back to remote antiquity. The former, which is generally considered as the melon of the Jews, mentioned in various places in the Bible, is believed to have originated in Egypt or Southern India, where it has been cultivated from time immemorial. It would appear that it was unknown to the ancient Greeks and Romans, as no definite information respecting it can be gleaned from their authors. The muskmelon, which is represented to have been a native of Asia, was known to the Greek and Roman physicians, and its properties and uses described by them at length.

The kind of muskmelon most esteemed among amateurs in various parts of Europe, and described, is the "Canteleup," so called from a place about fourteen miles from Rome, the country seat of the Pope, where this fruit has long been cultivated. This variety is stated to have been brought thither from that part of Armenia which borders on Persia, where it grows in the greatest perfection and abundance. The flesh of this melon, when fully matured, is delicious, and may be eaten with safety, without injury to the dyspeptic or those of the weakest stomachs. The form of canteleups is generally roundish, with a rough, warty, or netted outer rind, or skin. The size of the plant is rather small, and the flesh for the most part of a yellowish color, though with some it is green.

CONDENSED CORRESPONDENCE.

Statement of HEMAN POWERS, *of Lewiston, Niagara county, New York.*

For two years past, my method of cultivating melons has been, first to plant the seed on inverted sods of good thickness and size, in a hot-bed, in the month of April, and transplant them, sod and all, early in June. In this way the plants will take an early start, and are removed to the garden or field without retarding their growth by disturbing the roots.

In a similar manner, cucumbers, tomatoes, or other plants, may be accelerated in their growth several weeks.

Statement of CHAUNCEY E. GOODRICH, *of Utica, Oneida county, New York.*

The Green-fleshed variety of melon usually matures well here, if planted in hot-beds about the 15th of April, and carefully removed to the open ground the 10th of June. This is the most economical plan for the market gardener. The private gentleman, however, should make a small hot-bed for each hill, much earlier, from which the plants should never be removed. The melon may always be plucked in seventeen weeks after planting, with proper culture and the ordinary season. In a long, dry, and warm season, this edible fruit may often be finally matured here in perfectly open culture. This melon, as produced here, is said by travellers to be superior to those usually seen in the West Indies, or on the coast of South America. This is obviously due to superior culture, and not to soil and climate.

Considering that the melon may be so readily and cheaply raised in this climate, and that its best varieties are equal or superior to the peach, which cannot be produced here, it seems very desirable that it should be more generally cultivated, especially that it should supplant the old "Yellow Muskmelon." It should be generally known that surplus plants of this melon when pulled out of the hill, carelessly even, may be transplanted almost with the safety and certainty of cabbage-plants. Great care in sheltering the plant until it roots again, is of course needful. This part I have often verified. Cucumbers may be similarly transplanted; but, unlike the melon, they subsequently thrive slowly, and fruit very late. Our August market is flooded with this melon, brought from New Jersey; but it is never good, being necessarily picked prematurely, and bruised in transportation.

Our watermelons have a tender foliage, which is more readily destroyed by cold and wet weather than that of the Green-fleshed melon, which attains a large size, often exceeding 30 pounds. The best mode for open culture is to plant directly upon fresh green sward, recently inverted by the plough. I have twice raised heavy crops of late years in this way, at a very trivial expense. The culture in this case is of the simplest kind. The great discouragement with us in the culture of this melon, is the earliness and cheapness with which it is brought from the South.

CLIMATOLOGY.

U. S. PATENT OFFICE, *June* 19, 1854.

SIR: We should be glad to append to the Agricultural Report of the Patent Office, about to be published, a paper on the climatology of the United States, compared with that of Europe and other parts of the world, as far as practicable.

Such a paper is understood to be in existence; but as some of its most important materials, so far as regards American climatology, have been collected through the instrumentality of the Smithsonian Institution, they ought first to be given to the world through the reports of that Institution.

In view, however, of the great benefits that would result from an early publication of the above-mentioned paper in our report, I am induced to request of you the special favor of allowing it to be thus published, in anticipation of the appearance of those materials among the proceedings of the Smithsonian Institution.

I hope you will feel that a greater amount of benefit will thus be conferred upon the public than by delaying the publication till some subsequent period, which, I trust, will be a sufficient reason for granting this request.

Yours truly,
CHARLES MASON, *Commissioner.*

Prof. JOSEPH HENRY,
Secretary of the Smithsonian Institution,
Washington, D. C.

SMITHSONIAN INSTITUTION,
June 21, 1854.

SIR: The meteorological materials mentioned in your letter of the 19th instant were collected under the direction of the Smithsonian Institution, the board of Regents of the University of the State of New York, and the Medical Bureau of the army of the United States; and, in consideration of the claims of these parties, they ought first to be published in a general report under their sanction.

It is only in this way that due credit can be secured to all the institutions and individuals who have contributed to the collection; but, since the paper you mention has been prepared, and you propose to give it an immediate and wide circulation through the Report of the Patent Office, I do not consider myself at liberty, in behalf of the parties interested, to object to its publication.

I have the honor to remain, very respectfully, your obedient servant,
JOSEPH HENRY,
Secretary of the Smithsonian Institution.

Hon. CHARLES MASON,
Commissioner of Patents.

AGRICULTURAL CLIMATOLOGY OF THE UNITED STATES COMPARED WITH THAT OF OTHER PARTS OF THE GLOBE.

BY LORIN BLODGET.

The purpose in which this sketch of agricultural climatology was undertaken, was a doubtful or contingent one, designed to occupy such space only as should be found convenient to assign to the subject in connexion with the regular report of the agricultural department of the Patent Office. But in the preparation of the matter it was found better to take a more general view of the peculiar characteristics of American agricultural climatology as a preliminary step, and to make some general comparisons as a basis for treating any specific branch satisfactorily. A hasty general sketch and comparison of this with the Eastern continent was thus entered upon, and although now falling far short of the completeness desirable on that point, it is sufficiently complete, perhaps, for the purposes subsequently considered.

In entering upon a specific climatology, also, the basis of comparison appeared quite imperfect as found in other climatologies. The temperature measures indicated as the limits of, or as the more favorable conditions for, particular plants are frequently quite inapplicable to our own climate, and they are evidently quite vague even for Europe. Each seemed to deserve a new discussion by the aid of the light a new continent could throw on these more fixed relations; and though the labor of completing these several discussions was quite too great for the present time and place, some approach to that thorough treatment seemed necessary if an intelligible statement were made at all in this connexion. The statistics have therefore been employed in this direct association with some special single illustration, or some particular staple, and they have been made as fully illustrative of that particular point as was both possible and desirable.

In such a plan many products and many features of an agricultural climatology must remain unnoticed, unless considerable space be given the work. For the space available here, it seemed better to take the more prominent staples of cultivation, and the more prominent points in such a climatology, and treat them somewhat at length. Subsequently, opportunity may offer for extending and completing the analysis, if the present mode shall be found adapted to its purpose as far as it may go.

General character of the climate of the United States east of the Rocky Mountains, and its comparison with the climates, of the same latitudes, of the Eastern continent.

The principal conditions of climate, or those of temperature and amount of rain at least, have been very fully and accurately observed

in the United States for a considerable period. For the time of its occupation, indeed, no country has been more fully observed, as all definite instrumental observation dates only from quite recent times. The mercurial thermometer was first introduced in 1720, and it was probably invented near that date, though some writers have referred to its use a few years earlier.* Some years still earlier, the spirit thermometer was employed with a rude measure of accuracy, and for some of the dates about 1720, it is difficult to say which instrument was in use. The best series of thermometrical observations in Europe begin some years later, or about 1730, and one only at the date here given, that at Berlin in 1719. In the United States, the earliest recorded observations were at Charleston in 1738, but this record embraces only brief and detached periods of a few years each. At Cambridge, the first was in 1742, and valuable summaries embrace the whole subsequent period, with detailed means for the several months and years from 1770. At Philadelphia, the earliest that remain were in 1748–49, recommencing in 1758, and but little interrupted from that time forward. At Williamsburg, Virginia, observations commence in 1776, and embrace some valuable series, though not quite continuous from that date.

Generally, every important portion of the country possesses comparable series for the last thirty years, and there are several continuous series, not named above, of more than forty years.

Our climatology in temperature may, therefore, be quite complete for the period of our occupation of the territory, and we may adapt its results more directly to our want in the various requirements of practical knowledge of climate than has ever been done in Europe. Long and wasteful processes of experimenting upon the adaptation of climate to the various requirements of civilized life, were undergone by all the nations of the Old World in the course of the changes through which they have passed in emerging from barbarism. On the contrary, we may occupy a vast continent with definite measures of every condition of its climate at hand, and with full knowledge of the climatic requirement of the cultivation or the animal life we would introduce.

Precise determinations came last in Europe, or after experiment had decided what was practicable and what was not. Here we may use the known relations of climate to cultivation and animal life, as experiment and science have both determined them there, in entering upon the occupation of new districts, and in deciding what to attempt and what to avoid. For the first century, or perhaps more, of occupation by colonies in America, the losses and disasters were immense from this want of definite knowledge of the capacities and deficiencies of climate. They have continued to some extent until the present time, but they may now wholly cease, if we will but use the materials we have at hand.

In the outline of comparative climatology here proposed, it is designed to present the more striking facts and results of this description, and to show what precise conditions of climate have been found, in our

*The mercurial thermometer was used by the Italian philosopher Renaldini, as early as 1694, who proposed the method of graduating the instrument between the freezing and boiling points of water. The mercurial thermometer was also used by Roëmer, of Dantzic, before the year 1709. D. J. B.

new and brief experience, to be definitely favorable or unfavorable to particular products. Placing the definite measures of temperature and amount of rain in connexion with known success or failure of any cultivated staple, we may apply the comparisons directly in many cases here. We may designate anomalies also, and the divergence from the results in other countries, which may be due to peculiarities of our own climate, and the result may indicate new fields for some existing cultivation perhaps, or effect the introduction of what is elsewhere impossible,

The mode of procedure in this illustration will be, first to compare the climates of the temperate latitudes of the two continents generally in regard to the conditions of temperature and amount of rain. In this connexion, the characteristic differences will be particularly compared; and in respect to these, it is unimportant whether the distinguishing characteristics of the climates of this continent are regarded as anomalies or not. We possess conditions quite anomalous in regard to Europe, but it is not determined that the climates of Europe are more truly normal than our own; that is, that they are such as more properly belong to their latitude, considering the earth as a whole. In the introduction of European cultivation, we should, of course, retain that general basis of comparison; but America has added largely of indigenous plants to the list of cultivated staples, and has also developed singularly favorable conditions for the extension of the range of natives of the Old World.

With the general comparison proposed, or following it in the order of the more considerable products, specific comparisons for several important staples of cultivation will be given, selecting those to which such comparison would add illustrations of the greatest practical value. It is not anticipated that these will be complete or prove decisive in every case, but they can scarcely fail to be illustrative, and to assist those whose direct interest is concerned in their cultivation. A precise climatology of vegetable and animal life, which would embrace everything entering largely into the uses and requirements of civilized nations, is exceedingly desirable; but our material of observation and experiment is not yet sufficiently abundant, nor is the elasticity and power of acclimation of the several plants and animals determined within a sufficiently near approximation.

The principal results anticipated in the present case, therefore, are the indications of obvious and unmistakable relations; new, because they are developed in a new and partially occupied country, and becoming obvious by the application of instrumental tests and direct comparison with known results elsewhere.

The eastern half of the territory of the United States occupies a peculiar area in respect to some of the more important conditions of climate. A distinguishing feature is the great range of temperature in the annual changes, both in the means for the several months, and in the single non-periodic extremes. This last range has also its maximum at the most important periods of the year in the growth of plants affected by such extremes, thus exaggerating the measure of effect somewhat beyond that which would be apparent in the mere statement of its measure. The curve of horary variation of temperature is less abrupt than the monthly curve; yet greater by a considerable measure than would occur in connexion with the same mean temperatures in Europe.

In comparison with Europe, we have a tropical summer and a high northern winter; and the capacity of our climate for vegetable growths, or particularly for animals, ranges through all climates, from tropical to extreme north temperate, for almost the same districts. The peculiar staples which attain the highest perfection here differ, therefore, from those of any other continenal area, and embrace in the same localities those which are elsewhere widely separated, and appear only in distinct climates.

From this general semi-tropical summer we find peculiar developments of natives and acclimated products. The characteristic class is, in every instance, of sudden growth, exuberant, prolific; developing tropical characteristics in the preponderance of saccharine nutritive elements, and great perfection of essential oils and narcotic qualities.

Indian corn, cotton, tobacco, cane, &c., which are elsewhere tropical, or are natives of tropical regions, have a large range here; and two of these, indeed, may be cultivated successfully to the fiftieth parallel of latitude, or much beyond our northern boundary. Hemp, the vine, peach, &c., are similar in their requirements, and in their unusual range in our climates. A slight attention to the general character of these characteristic growths will show our climates to be singular in their capacity. The comparisons with other districts in similar latitudes, or with similar temperatures, on the Eastern continent, must be made in view of this general character, and with careful distinctions of correspondence, or want of correspondence, in this respect, for each district.

Next to temperature, *humidity* and *distribution of rain* are controlling in their influence upon our climate, and the United States are signally distinguished from other continental areas in temperate latitudes in respect to these conditions. The amount of precipitation is very great, and greatest in summer, increasing the thermal effect much beyond that which the same air temperatures would produce in arid districts. This relation of the precipitation to the temperature in respect to seasons, holds true in the comparison of districts also; those of the highest temperature having, as a rule, the greatest amount of rain. The distribution among the months affecting annual growths and staple cultivation is, however, practically nearly equal; the greater amount in the warmest months scarcely rendering the general humidity equal to that of the cooler months affecting cultivation. With a certain limit in non-periodic extremes the mean distribution of rain presents the most extraordinarily favorable conditions for vegetable production, and almost precisely corresponds to the advantages in temperature.

Before proceeding further with the peculiar features of the climate of this portion of the continent, some tabular statements may be given, illustrating this contrast in the monthly range of temperature as compared with Europe. The comparison of mean temperatures for each of the months should be given in this tabular statement, as our common comparisons are with the temperatures for the colder months and the annual mean. It will be found that in summer much of the excess of heat in the same latitudes in Europe disappears, and that we approach much nearer to their measure of heat for that season than is usually supposed.

Temperatures of the North American continent in temperate latitudes.

Places.	Latitude	No. y'rs.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Spring.	Summer	Autumn	Winter.	Year.
Albion Mines, N. S.	45° 34'	10	18.8	19.4	27.1	37.3	48.5	58.3	66.1	65.6	56.3	46.5	36.0	23.7	37.6	63.3	46.3	20.6	42.0
Quebec	46 49	10	9.9	12.8	24.4	38.7	52.9	63.7	66.8	65.5	56.2	44.1	31.5	17.3	38.6	65.3	44.0	13.3	40.3
Montreal	45 31	27	15.0	17.5	29.4	43.5	58.1	68.4	73.1	70.8	60.6	46.5	33.7	19.1	43.7	70.8	46.9	17.2	44.6
Castine, Me	44 23	40	21.4	22.5	30.4	41.4	50.3	59.4	64.8	64.7	58.4	48.4	38.0	25.6	40.7	62.0	48.3	23.2	43.4
Portsmouth, N. H	43 04	17	25.1	25.4	33.4	42.3	52.0	61.3	66.6	65.0	58.9	49.8	38.3	27.0	42.6	64.3	49.0	25.8	45.2
Burlington, Vt	44 27	18	20 5	20.8	30.9	42.0	54.9	64.7	69.4	68.1	59.5	47.3	35.9	23.9	42.6	67.4	47.5	21 8	44.8
Salem, Mass	42 31	43	25.6	27.7	35.4	46.0	56.8	67.2	72.5	70.5	63.0	51.3	40.0	30.3	46.1	70.1	51.4	27.9	48.9
Boston, Mass	42 21	26	27.8	27.9	36.2	46.4	56.5	66.2	71.6	69.4	62.2	51.5	41.0	31.1	46.3	69.1	51.6	28.9	48.9
New Bedford, Mass	41 38	41	28.6	29.0	35.6	44.6	54.2	63.7	69.3	68.2	61.8	51.9	41.9	32.3	44.8	67.1	51.9	30.0	48.4
Providence, R. I	41 49	21	28.5	26.8	34.8	44.8	55.5	65.3	72.7	68.6	60.7	50.3	39.1	30.1	45.0	68.9	50.0	28.5	48.1
New York, N. Y	40 42	30	30.2	30.8	38.5	49.1	59.6	69.1	74.9	73.3	65.9	54.3	43.5	33.9	49.1	72.5	54.6	31.6	51.9
Albany, N. Y	42 39	22	24.5	24.3	34.8	47.7	59.8	68.0	72.2	70.3	61.4	49.2	39.4	28.3	47.4	70.2	50.0	25.7	48.3
Rochester, N. Y	42 45	18	26.1	25.8	33.0	45.8	56.2	64.5	69.7	67.8	60.1	47.7	38.2	28.8	45.0	67.3	48.7	26.9	47.0
Toronto, C. W	43 39	13	22.9	24.3	30.8	41.4	51 8	61.1	66.3	65.6	57.3	44.9	36.3	27.0	41.7	64.3	46.2	24.7	44.2
Philadelphia, Pa	39 57	57	30.8	29.4	38.1	51.1	62.9	71.5	75.2	72.4	65.9	53.9	42.3	31.2	50.7	73.0	54.0	30.5	52.1
Baltimore, Md	39 17	22	33.1	34.3	42.4	53.0	63.2	71.6	76.6	74.5	67.7	55.8	45.0	37.8	52.9	74.3	56.1	34.4	54.4
Norfolk, Va	37 02	25	40.5	41.0	47.5	56.1	65.9	74.2	78.3	77.1	71.4	61.7	51.2	43.2	56.5	76.5	61.5	41.5	59.0
Charleston, S. C	32 42	20	50.4	51.7	58.3	65.0	72.8	78.5	81.3	80.3	76.1	67.2	59.0	51.2	65.4	80.1	67.5	51.1	66.0
Savannah, Ga	32 05	11	52.6	54.7	60.0	68.4	74.8	79.4	81.3	80.6	76.9	67.2	58.3	52.2	67.7	80.4	67.5	53.0	67.2
Key West, Fla	24 33	9	70.0	70.7	73.8	76.3	80.2	82.1	83.3	83.5	82.5	79.1	75.6	72.8	76.8	83.0	79.1	71.2	77.5
Mobile, Ala	30 40	10	51.3	53.7	59.4	67.1	74.1	77.8	79.8	79.4	76.1	65.7	57.0	52.3	66.9	79.0	66.3	52.4	66.1
New Orleans, La	30 00	18	54.8	54.5	61.5	67.6	74.0	78.6	80.4	79.6	77.1	69.1	57.5	56.2	67.7	79.5	67.9	55.2	67.6
Fort Gibson, C. N	35 40	25	40.8	42.6	52.4	62.6	69.8	76.1	80.4	80.2	72.4	61.3	49.9	40.8	61.6	78.9	61.5	41.4	60.8
St. Louis, Mo	38 37	16	33.2	34.9	44.3	59.0	66.3	73.8	78.4	76.3	68.1	54.9	40.1	33.8	56.5	76.2	54.4	34.0	55.6
Cincinnati, Ohio	39 06	18	33.5	34.1	43.4	54.5	63.5	71.1	76.3	73.7	65.5	53.0	42.3	33.8	53.8	73.7	53.6	33.8	53.7
Marietta, Ohio	39 25	24	32.2	34.1	42.6	53.0	61.8	69.2	72.7	70.9	63.5	51.8	42.6	34.7	52.5	70.9	52.6	33.7	52.4
Fort Gratiot, Mich	42 55	17	25.5	25.1	33.0	44.4	53.9	63.6	69.4	67.6	60.5	47.7	38.0	27.9	43.8	66.9	48.7	26.2	46.4
Green Bay, Wis	44 40	23	18.9	20.6	31.4	43.0	57.7	66.6	71.3	67.9	57.2	46.5	36.7	20.8	44.0	68.6	46.8	20.1	44.9
Fort Snelling, M. T	44 58	30	15.0	18.5	30.7	46.5	59.0	68.0	73.5	69.8	58.7	46.8	31.9	17.2	45.4	70.4	45.8	16.9	44.6
Sault Ste. Marie, Mich	46 29	21	17.4	16.7	25.7	38.5	49.5	59.5	65.1	63.2	54.0	43.7	32.8	21.3	37.9	62.6	43.5	18.5	40.6
Pembina, M. T	49 00	1	.....	.....	18.2	31.0	53.7	.....	74.4	69.0	.....	.....	21.7	5.4	31.0	.....	.....	.....	.....
Fort Kearney, M. T	40 40	4	20.6	25.9	35.9	44.3	59.6	68.4	73.9	71.6	64.8	50.8	33.8	18.5	46.6	71.3	49.8	21.6	47.3
Fort Laramie, M. T	42 12	3½	31.2	33.5	35.5	44.5	56.1	67.1	75.1	73.1	64.3	49.8	32.7	23.8	45.4	71.8	48.9	29.5	48.9
Brownsville, Texas	25 57	3½	59.5	66.9	69.4	74.5	78.9	80.8	83.3	84.6	80.4	73.9	66.9	60.9	74.3	82.9	73 7	62.4	73.3
San Antonio, Texas	29 25	3½	52.7	57.9	65.5	69.7	76.4	80.5	82.3	83.8	79.9	72.2	62.2	52.1	70.5	82.2	71.4	54.2	69.6
Fort Fillmore, El Paso, N. M.	32 03	1½	41.7	49.8	52.9	60 3	68.0	78.5	82.5	80.1	77.9	60.0	46.9	43.1	60.4	80.4	61.6	44.9	61.8
Santa Fé, N. M	35 41	6	34.8	35.7	44.7	54.0	66.9	72.5	75.3	72.9	62.3	52.8	37.8	29.7	55.2	73.6	51.0	33.4	53.3
Fort Yuma, N. M	32 43	1	54.4	53.1	62.6	72.9	.....	87.7	89.5	88.7	84.6	74.0	61.8	53.9	.....	88.6	73.1	53.8	72.2
San Diego, Cal	32 41	2 2-12	52.7	54.4	55.3	59.1	61.9	66.1	70.7	74.0	73.0	65.9	57.0	51.6	58.8	70.3	65.3	52.2	61.6
San Joaquin, Cal	37 40	1 5-12	49.3	57.4	56.6	65.5	74.9	88.5	.....	82.9	78.1	67.1	56 6	49.7	65.7	86.0	67.3	52.1	67.8
San Francisco, Cal	37 48	1 2-12	50.1	51.0	53.8	57.7	55.9	58.8	57.9	62.2	61.6	61.9	56.2	50.0	55.9	59.6	59.9	50.4	56.4
Monterey, Cal	36 37	4	53.2	50.9	52.4	53.7	55.7	58.0	58.4	58.4	59.8	58.5	54.5	51.8	53.9	58.3	57.6	52.0	55.4
Fort Ross, Cal	38 35	4	47.2	48 0	49.9	51.3	55.3	56.9	57.9	58.4	56.0	53.4	50.9	48.9	52.2	57.7	53.1	48.0	52.8
Salt Lake, Utah	40 46	7-12	28.3	30.5	34.3	45.4	64.7	71.2	80.5	.....	.....	.....	.....	.....	48.1	.....	.....	.....	.....
Oregon City, Oregon	45 20	3	39.6	42.0	45.2	55.9	60.9	66.3	72.3	71.9	61.2	55.8	47.2	39.1	54.0	70.2	54.4	40.2	54.7
Steilacoom, Oregon	47 07	3 2-12	40.1	41.3	41.8	48.6	56.3	61.3	64.4	64.6	56.4	52.2	46.5	36.7	48.9	63.4	51.7	39.4	50.8
Sitka, Russian America	57 03	10	35.7	36.3	39.7	45.1	48.8	54.9	58.5	59.0	53.9	46.5	40.8	34.5	44.5	57.5	47.0	36.5	46.4

Temperatures of the Eastern continent in temperate latitudes.

Places.	Latitude.	No. of years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Catania, Sicily	37° 30′	6	54.7	55.6	58.1	60.4	71.0	76.5	81.7	84.2	77.8	70.1	63.7	57.3	63.2	80.8	70.5	55.9	67.6
Naples, Italy	40 52	13	46.2	47.6	51.1	56.7	64.8	70.8	76.1	76.2	69.3	61.9	53.1	49.1	57.5	74.4	61.4	47.6	60.2
Rome, Italy	41 54	20	45.0	47.3	51.6	57.8	65.2	71.1	75.9	75.6	70.1	64.8	53.4	47.8	58.2	74.2	62.7	46.7	60.5
Venice, Italy	45 26	20	35.3	38.9	46.1	54.7	63.4	70.4	75.1	73.7	66.2	56.6	44.6	39.9	54.7	73.0	55.8	38.0	55.4
Milan, Italy	45 28	59	33.2	38.3	45.9	54.6	64.1	70.6	74.7	73.5	66.4	56.9	47.1	36.5	54.8	73.0	56.8	36.0	55.2
Cadiz, Spain	36 32	2	51.4	53.7	55.2	59.6	63.7	68.1	70.2	72.8	70.2	67.1	58.8	53.6	59.5	70.4	65.3	52.9	62.0
Lisbon, Portugal	38 42	5	52.5	53.6	56.3	59.0	63.6	69.4	72.1	71.2	69.4	62.6	55.4	51.4	59.6	70.9	62.5	52.5	61.4
Madrid, Spain	40 25	2	42.4	44.4	48.2	55.6	63.1	71.9	78.2	78.9	68.0	56.5	47.8	42.6	55.6	76.4	57.4	43.1	58.1
Funchal, Madeira	32 37	2	60.2	61.1	63.4	65.4	67.9	69.4	71.7	72.8	72.1	69.5	65.4	64.2	68.6	71.3	69.0	61.8	66.9
Marseilles, France	43 18	5	43.2	45.4	48.4	56.1	63.2	71.0	75.9	71.9	68.7	58.7	50.2	47.1	55.9	72.9	59.2	45.2	58.3
Bordeaux, France	44 50	10	41.0	45.0	51.3	56.1	60.8	66.9	73.1	73.2	67.1	58.1	48.4	43.2	56.1	71.1	57.9	43.1	57.0
Dijon, E. France	47 19	7	33.6	36.7	48.2	51.1	60.6	66.0	70.2	72.5	62.4	53.8	43.7	35.8	53.3	69.6	53.3	35.4	52.9
Geneva, Switzerland	46 12	30	31.0	36.2	42.6	51.7	62.2	67.5	71.7	71.7	65.1	53.9	43.7	34.8	52.2	70.3	54.2	34.0	52.7
Strasburg, France	48 35	32	31.0	35.9	41.9	49.7	58.2	62.6	65.8	65.1	58.7	50.0	41.1	35.7	49.9	64.5	50.0	34.2	49.7
Manheim, Rhine, Germany	49 29	8	33.3	35.6	40.2	50.7	59.5	67.2	68.8	66.3	61.8	49.3	38.7	31.9	56.1	67.4	50.0	33.6	50.3
Munich, Germany	48 08	25	29.6	33.0	41.2	46.9	57.6	62.1	64.7	64.1	58.1	49.2	39 0	34.9	48.5	63.6	48.8	32.5	48.4
Vienna, Austria	48 13	60	29.3	33 5	40.8	51.8	62.1	67.5	70.7	69.9	61.9	51.2	40.3	33.0	51.6	69.4	51.1	31.9	51.0
Berlin, Prussia	52 31	24	27.7	31.6	38.1	47.4	56.5	63.3	65.8	64.4	58.4	49.9	39.3	34.9	47.4	64.5	49.2	31.4	48.1
Bremen, N. Germany	53 05	12	29.5	34.1	39.1	46.2	55.9	61.9	64.6	63.3	57.7	50.1	39.1	35.6	47.1	63.3	49.0	33.1	48.1
Amsterdam, Holland	52 23	12	33.2	36.8	40.7	48.1	55.7	62.5	65.3	65.3	60.6	51.1	41.9	36.9	48.2	64.4	51.2	35.6	49.8
Paris, N. France	48 50	39	35.4	39.5	44.0	49.7	58.1	62.7	65.6	65.3	60.1	52.2	44.1	38.5	50.6	64.5	52.2	37.8	51.3
London	51 31	65	37.2	40.1	42.5	46.9	53.5	60.5	62.4	62.1	58.1	50.7	45.0	40.4	47.6	61.7	51.3	39.2	49.7
Dublin	53 20	17	39.2	40.7	43.2	48.0	54.3	60.2	61.4	61.4	56.4	50.0	43.7	42.0	48.5	61.0	50.0	40.6	50.0
Aberdeen	57 09	8	37.8	39.0	42.8	47.5	54.3	58.5	60.4	59.6	56.7	49.9	43.2	40.1	48.2	59.5	49.9	39.0	49.2
Edinburg	55 57	17	37.3	38.2	40.5	44.1	50.3	56.0	58.7	56.8	53.4	48.8	41.4	39.7	45.0	57.1	47.9	38.4	47.1
Stockholm	59 21	50	24.3	26.6	29.6	36.7	48.2	57.0	63.4	60.8	53.6	44.2	35.3	27.1	38.2	60.4	44.4	26.0	42.2
St. Petersburg	59 56	15	14.7	18.7	25.5	37.1	48.5	59.9	63.9	61.1	51.3	41.3	30.4	22.5	37.0	61.7	41.0	18.6	39.6
Moscow, Central Russia	55 45	21	13.5	16.0	26.7	41.7	54.4	62.4	66.4	63.1	53.2	39.5	27.1	16.0	40.9	63.9	39.9	15.2	40.0
Catherinoslav, S. Russia	48 20	10	16.2	20.9	32.7	46.7	60.2	68.4	72.8	69.5	61.5	48.3	36.3	21.7	46.5	70.3	48.7	19 6	46.3
Odessa, S. Russia	46 29	9	25.6	29.7	34.2	46.4	57.6	66.2	73.1	70.7	59.6	52.4	39.4	33.3	46.1	70.0	50.5	29.5	49.0
Constantinople	41 00	4	40.5	42.5	46.5	54.2	62.7	71.6	75.6	75.6	67.7	64.4	51.9	42.5	54.5	74.3	61.3	41.8	58.0
Jerusalem	31 47	1	47.7	53·7	60.0	64.7	66.8	71.7	77.3	72.5	72.2	68.4	58.9	47.4	63.8	73.8	66.5	49.6	63.4
Teflis, Caucasus	41 41	5	31.7	37.0	45.0	54.7	63.7	68.9	75.8	75.4	66.4	57.5	44.8	38.0	54.4	73.4	56.2	35.6	54.9
Astrachan, Caspian Sea	46 21	(?) 5	12.6	20.9	35.8	52.4	69.6	73.2	76.9	77.6	68.3	50.1	38.8	23.9	52.6	75.9	52.4	19.2	50.0
Barnaoul, Central Asia	53 20	6	−5.6	4.3	9.2	33.3	50.7	61.7	67.5	60.3	47.5	35.6	13.5	0.3	31.1	63.2	31.5	−0.3	31.4
Pekin, China	40 00	3	25.9	32.8	43.1	56.2	67.3	74.6	78.8	76.9	67.8	53.9	41.9	29.4	55.6	76.8	54.6	29.4	54.1
Canton, China	23 08	10	52.5	55.0	62.5	70.0	77.0	81.0	83.0	82.0	80.0	73.3	65.2	57.1	69.8	82.0	72.8	54.9	69.9
Nangasaki, Japan	32 45	4	43.4	44.0	50.4	61.0	69.0	77.1	80.2	83.2	78.0	66.5	53.2	47.2	60.1	80.2	65.9	44.9	62.8

The two tables give the mean temperatures of all important climates in the north temperate latitudes of both continents. The stations on the Eastern continent give successive series in different longitudes or groups of comparable districts. Catania, in Sicily, is more nearly than any other an exceptional locality, and scarcely the representative of any considerable district. It gives much the highest temperatures observed in Europe. Naples and Rome are strikingly like Philadelphia and Cincinnati in their summer temperatures, and do not differ largely in latitude. Fort Madison, in Iowa, differing but about one degree of latitude from Rome, has almost precisely the same temperature for the three summer months.

Cadiz and Madrid do not exceed the summer temperatures of the same latitudes in our own interior. Marseilles is on the tropical side of the Alps, yet its contrast is only equal to three degrees of latitude.

Bordeaux, in the southern wine district of France, has its summer temperatures exceeded at Fort Snelling, in the same latitude, and at Montreal, one degree further north. Burlington, Vermont, in nearly the same latitude, has the same temperature for the three summer months. Geneva and Vienna are repeated at Montreal and Burlington, differing but one degree in one case and three degrees in the other from correspondence of latitude.

Strasburg, Paris, Berlin, and all the northern plain of Western Europe, give nearly the same measures for the three summer months, and all fall below Quebec at 47° of latitude, and Fort Union, of the Missouri, at 48°. The range of these mean temperatures for the three months falls very little below the corresponding latitudes in the St. Lawrence valley, and on the Saskatchawan, in British America.

The summer temperatures for the British Islands are all below the range for the same months in any part of the United States, except the immediate coast of the Pacific. There the means for the summer months are repeated with little change through twenty-three degrees of latitude, or from Santa Barbara, of California, to Sitka, in Russian America, 34° to 57° north. There is no portion of the continent eastward in which the winter temperature is such as to render it habitable where the summer temperature falls so low, except the remote locality of St. Johns, Newfoundland.

Stockholm and St. Petersburgh have a higher temperature than the group just mentioned, and are in three or four degrees higher latitude. They have no parallel on this continent.

In Eastern Europe and Asia the comparisons become again instructive. Constantinople is quite the parallel of Baltimore in temperature for the summer; the six warmer months giving almost precisely the same measures. The difference of latitude is but one degree and forty minutes. Odessa, at the southern border of the great grain-growing district of Southern Russia, compares very nearly with Rochester, Albany, and Boston, for each month, and for the whole year; and, for the first of the European list, reproduces the temperature curves and general climate of the eastern United States. Catherinoslav, in the centre of this grain district, north of Odessa, most resembles Montreal, northern Wisconsin, and Fort Snelling.

For the interior of Russia, at Barnaoul, and the Caspian Sea, at As-

trachan, we have no parallel, though the valley of the Great Salt Lake approaches nearest the summer temperatures of Astrachan; the Asiatic interior being much colder in winter. The contrasts in elevation in these cases between the districts corresponding in latitude and temperature render comparison impossible.

On the great area of the Chinese empire, however, we have general physical conditions so far analogous to those of the United States, that such comparisons as the few observations there enable us to make should be direct and instructive.

Pekin, in 40° north latitude, differs from Philadelphia, Marietta, and other places in the same latitudes here, in its lower winter and higher summer temperatures—the annual mean being nearly the same. The adjacent deserts and the smaller annual amount of rain may cause this difference, and may render these climates an extreme beyond those of the United States in the same direction of divergence from those of Europe. Further south in China this continental character of climates seems to disappear. We have no perfect representative of the tea district. Canton itself is too nearly tropical, yet its means of temperature may show us clearly that the greater tea districts are both warmer and drier than any available portion of the eastern United States. They lie in 27° to 29° north latitude, and in or near these we have no considerable or continental areas. The immediate coasts of the Gulf of Mexico, and from Charleston southward on the Atlantic, give sufficiently high temperatures; but they are humid or sea climates for the most part, and not analogous to the inland and variously-elevated tea districts of China. Nangasaki, in Japan, and in the latitude of Charleston, has a decidedly lower temperature for the colder months, and might be compared with the United States interior in latitudes two degrees further north. If the tea-plant is successful in this portion of Japan, as it is said to be, there is a large district of the United States in which the temperature condition is sufficiently favorable. It is probable, however, that the range of extremes in temperature, and especially in humidity, which are characteristic of the United States, would affect this cultivation injuriously, if not quite prevent it. We have very few direct measures of these conditions for any part of China, and can only infer from the few data we have that the amount of precipitation and the range of extremes in humidity and temperature are much less there than here.

DIRECT COMPARISON OF EUROPE AND AMERICA.

Classifying the climates of the two lists of stations, excluding those of Asia, a small number of each may be separated as being nearly tropical. The high temperature of the winter months and the low curve of monthly differences mark these more distinctly than the absolute temperatures of the summer months. Southern Italy, including Rome, Cadiz, Lisbon, and Jerusalem, of the Eastern continent, and Savannah, Key West, Mobile, New Orleans, San Antonio and Brownsville of Texas, El Paso of New Mexico, Fort Yuma and San Joaquin of California, correspond in the tropical character of the means of temperature. The American localities give absolutely higher temperatures in this comparison, yet

the resulting character of the climate is much less permanently tropical, if it may so be termed, as extremes in any year and extreme years intrude far and fatally into these districts in American climates, cutting off the products which require a winter temperature without extremes. Annuals may therefore flourish where tropical trees and fruits fail entirely; and such, indeed, is the general character of the comparison which may be instituted between all the warmer districts of the two continents, and to the limit of abundant vegetable production northward.

Another list of climates for the Eastern continent may be given which will compare very well with the most nearly tropical of the United States in productive capacity. Venice, Milan, Marseilles, Bordeaux, and Constantinople, are of this class. They rank with the American stations first given in production of semi-tropical fruits and annuals, but in temperature they fall much behind them, and compare in this respect with Norfolk, Richmond, Memphis, Fort Gibson, and the interior of California, in the latitude of San Francisco.

For these classes, the following table, giving the differences of the several months from the mean for the year, will illustrate the semi-tropical character and excessive summer temperatures of American climates in contrast with those of Europe.

Comparison of the mean for each month and the summer with the mean for the year in semi-tropical climates.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Summer.
Catania	—13.0	—12.0	—9.5	—7.2	3.4	8.9	14.1	16.6	10.2	2.5	—4.0	—10.3	13.2
Naples	—14.0	—12.6	—9.1	—3.5	4.6	10.6	15.9	16.0	9.1	1.7	—7.1	—11.1	14.2
Rome	—15.5	—13.2	—8.9	—2.7	4.7	10.7	15.4	15.1	9.6	4.3	—7.1	—12.7	13.7
Cadiz	—10.2	—8.3	—6.8	—2.4	1.7	6.1	8.2	10.8	8.2	5.1	—3.2	—8.4	8.4
Lisbon	—8.9	—7.8	—5.1	—2.4	2.2	8.0	10.7	9.8	8.0	1.2	—6.0	—10.0	9.5
Jerusalem	—15.7	—9.7	—3.4	1.3	3.4	8.3	13.9	9.1	8.8	5.0	—4.5	—16.0	13.9
Savannah	—14.6	—12.5	—7.0	1.3	7.6	12.2	14.2	13.4	9.8	0.1	—8.9	—17.0	13.2
Key West	—7.5	—6.8	—3.7	—1.2	2.7	4.6	5.8	6.6	5.0	1.6	—1.9	—4.7	5.5
Mobile	—14 8	—12.4	—6.7	1.0	8.0	11.7	13.7	13.3	10.0	—0.4	—9.1	—13.8	13.0
New Orleans	—12.8	—12.5	—6.1	0.0	6.4	11.0	12.8	12.0	9.5	1.5	—10.1	—11.4	12.8
San Antonio	—16.9	—11.7	—4.1	0.1	6.8	10.9	12.7	14.2	10.3	2.6	—7.4	—17.5	12.6
Brownsville, Tex	—13.8	—6.4	—3.9	1.2	5.6	7.5	10.0	11.3	7.1	0.6	—6.4	—12.4	9.6
*El Paso	—20.1	—12.0	—8.9	—1.5	6.2	16.7	20.7	18.3	16.1	—1.8	—14.9	—18.7	18.6
*Fort Yuma	—17.8	—19.1	—9.6	0.7	.....	15.5	17.3	16.5	12.4	1.8	—10.4	—18.3	16.4
*San Joaquin	—18.5	—10.4	—11.2	—2.3	7.1	20.7	.....	15.1	10 3	—0.7	—11.2	—18.1	18.2

* In absolute temperatures these stations rank here; in the curve of monthly differences they belong to the second list, in which, also, El Paso is given.

Comparison of the mean for each month and for the summer, with the mean for the year.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Summer.
Venice.....	—20.1	—16.5	—9.3	—0.7	8.0	15.0	19.7	18.3	10.8	1.2	—10.8	—15.5	17.6
Milan.....	—22.0	—16.9	—9.3	—0.6	8.9	15.4	19.5	18.3	11.2	1.7	—8.1	—18.7	17.8
Marseilles.....	—15.1	—12.9	—10.0	—2.2	4.9	12.7	17.6	13.6	10.4	0.4	—8.1	—11.2	14.6
Bordeaux.....	—16.0	—12.0	—5.7	—0.9	3.8	9.9	16.1	16.2	10.1	1.1	—8.6	—13.8	14.1
Constantinople...	—17.5	—15.5	—11.5	—3.8	4.7	13.6	17.6	17.6	9.7	6.4	—6.1	—15.5	16.3
Norfolk.....	—18.5	—18.0	—11.5	—2.9	6.9	15.2	19.3	18.1	12.4	2.7	—7.8	—15.8	17.5
Richmond.....	—19.6	—12.5	—9 7	—3.2	8.8	15.9	19.5	17.0	10.0	0.5	—9.3	—17.4	17.4
Memphis.....	—19.6	—14.8	—5.5	—1.8	8.1	15.0	19.1	17.8	11.7	—2.4	—7.6	—20.6	18.7
Fort Gibson.....	—20.0	—18.2	—8.4	1.8	9.0	15.3	19.6	19.4	12.6	0.5	—10.9	—20.0	18.1
El Paso.....	—20.1	—12.0	—8.9	—1.5	6.2	16.7	20.7	18.3	16.1	—1.8	—14.9	—18.7	18.6

By reference to the tables previously given, it may be seen that the absolute temperatures given for American stations exceed those for the Eastern continent, where the curve of differences is the same. This curve of differences of successive months is a better measure of the productive rank of these climates, within certain limits, than the absolute temperatures. They are therefore separated into two lists, which will be found to correspond strikingly in this measure of monthly differences. The adaptation of each to classes of products, or to any particular staple, is best shown by this comparison for all that temperature, as a single condition of climate may control.

Cadiz, Lisbon, and Key West, of the first list, and Bordeaux and Marseilles of the second, are modified considerably by the influence of the sea. The annual mean of each station in the first list is above 60°, and in the last above 55°.

In the peculiar conditions afforded by the American climate in distinction from the European, the range of distinctively American products becomes very great. Maize ranges over the whole continent, except the immediate coast of the Pacific, to the northern limit of the United States, and over most of the cultivable part of British America.

The range of the grape, in some degree or in some variety, is scarcely less. The peach, as a fruit, originally of warm climates; tobacco, as a product of similar climatic affinities; hemp, sweet potatoes, cotton, and the cane—all share in a large measure these peculiar requirements of climate, and all have, in the United States, a most extraordinary range of possible production, and a great range of highly successful cultivation. These all deserve consideration in mass in this connexion of general climate, as they all have, notwithstanding their great diversity of character, and their division among every class of vegetable adaptations to human uses, very similar requirements in climate for their growth.

They are, also, all high developments of vegetable organisms. The nutritive class, corn, cane, and the fruits are in the highest grade of nutritive development. Tobacco, and the plants producing fibre for manufacture, are the highest developments of their classes respectively, and are associated elsewhere with tropical or semi-tropical climates.

This characteristic of our production and climate, as a whole, is very

important in acclimation, and in comparison with the old continent. Our range is far greater than any other part of the world indeed, in products partially or wholly successful, as we have the semi-tropical and tropical productions of the Eastern continent mingling here with their and our extremes of adaptation to the colder latitudes. All the Cereals and grasses, and the succulent vegetables, of both slow and rapid growth, here border closely on the cane and cotton, and mingle successfully with the grape, peach, hemp, and tobacco. They do not, however, attain perfection of development unfailingly, and this is the greatest disadvantage of our climate in all respects. The conditions requisite to successful production may, for one year, be all that can be desired, and yet the oscillation of climate is so great that the next may be entirely unsuccessful.

It is most important, perhaps, to define the districts in which certain products may be fully relied upon. The possible range is extremely interesting as a scientific fact, but it should always be distinguished from the safe and reliable range on which business operations may be based. Indian corn, the grape and peach, hemp and tobacco, *may be cultivated* in most parts of the United States east of the Rocky mountains; yet the culture of every one is very much restricted, except perhaps Indian corn, in profitable and reliable production as a business. So, also, of the grasses and Cereal grains, fruit, succulent vegetables, &c.

Some further comparison of temperature and humidity of the various districts of Europe and America may be made before examining the precise localization of these staple products. For this purpose, the measures of each of these conditions of climate, in the districts of most successful cultivation of any one, should be known, and the differences of our climate from the European, under which the same success has been attained, be distinctly given, where actual introduction of any production has taken place, or where it is proposed.

Applying the test of mean temperatures for July to Europe, we find England to fall below the minimum of the requirement for the growth of Indian corn in every part. This mean ranges from 55° to 62° for the principal districts of England, Scotland, and Ireland. Chiswick Gardens, representing the most favorable locality near London, attains 63°. Generally, the best agricultural districts do not attain 60° for the mean temperature of July; and notwithstanding the uniformity of the climate, and the skill of English cultivation, no progress has been made in the acclimatization of several of the distinctively American staples and fruits.

Kaemtz limits the growth of maize in France at Rochelle, on the Atlantic coast, and at Strasburg on the Rhine, which give very nearly the precise measure of temperature for July, and are found to be the limit in America.

At Paris, a series of forty years gives 65° as the mean for July. Versailles, Arras, Dunkirk, and other stations in Northern France, give but 65° as the mean temperature for July.

In Holland the mean varies from 60° to 64°; a series of ninety-two years at Zwanenburg giving 63.5°, which is probably near the true mean for the whole low country of Holland.

In Germany, Berlin attains 65° as the mean for July and August

or a long series of years. Hamburg, Bremen, and all other stations in the north of Germany, fall below this temperature, to 63° and 62°.

In Southern Germany the deeper valleys only attain to 68° or 70° for July and August. A portion of the valley of the Rhine, at Manheim and Heidelberg, and at Geneva, with the valley of the Danube at Vienna, are the principal exceptions to the general maximum limit of 65° as the mean temperature of the warmest summer month.

In Italy, the summer temperatures rise abruptly from 72° to 78° for the months of July and August; and the latitudes of 40° to 46° there, correspond with 37° to 41° in the United States. Florence and Genoa, in latitude 44°, have a mean temperature of 77° for July—the same as that of Baltimore, in latitude 39°. Milan, in latitude 45°, corresponds with Philadelphia, latitude 40°, both having a mean for July of 74°. Catania, at the sea-level, in latitude 37° 30′, has a mean temperature for August (there apparently the warmest month) of 84°, or very nearly that of Brownsville, on the lower Rio Grande, in 26° north latitude.

These last references are less important than those for Central Europe and England, and their comparison with the United States. To the Italian and Spanish border on the south, however, the temperature measure of capacity for particular productions is extremely precise and direct, and the specific ranges and limitations will appear very strikingly in the notice of the separate staples.

COMPARATIVE DISTRIBUTION OF RAIN IN THE TEMPERATE LATITUDES OF THE TWO CONTINENTS.

Much less is known of the principal facts of amount and distribution of rain, both for Europe and the United States, than of temperature measures. Tables of mean amount, for different districts, are somewhat difficult to procure for Europe, as no recent general collection of them has been made.* The facts are indispensable for the comparisons at the basis of an agricultural climatology, however; and in the following tables, representative localities are given as fully as the facts at hand permitted, and perhaps as fully as may be required for the illustration.

The climate of the older United States is readily illustrated in this respect. We have here no contrasts of a local character, nor abrupt transitions from districts of profuse precipitation, to those with little or none. This may be said, however, of the eastern portion of the United States, or east of the Rocky mountains only; the western portion being quite decidedly local and peculiar in its amount and distribution.

In Europe the distribution is mainly local. The plain of Northern and Central Europe is, perhaps, the only portion on which a symmetrical amount and distribution exist; and the general irregularity in this respect has diverted attention from the illustration of this condition. In the table for the Eastern continent, the localities are selected as representative of considerable districts, as far as this is possible.

* Many of the series used here are from Gasparin's *Cours d'Agriculture*, in which most of Schaw's researches, embraced in his "Climate of Italy," are embodied. Both these tables are very full and valuable, but the most recent of Gasparin's was published in 1844. (See vol. 2 of *Cours d'Agriculture*.)

Amount of rain in the temperate latitudes of North America, (inches and tenths, vertical depth.)

Places.	Latitude.	No. of years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Gardiner, Me	44° 10′	16	3.4	2.8	3.1	3.3	4.2	3.6	3.1	3.6	2.8	4.1	3.6	3.9	10.6	10.3	10.5	10.1	41.5
Hanover, N. H	43 45	18	2.9	2.7	3.0	3.1	3.8	3.9	3.5	4.0	3.0	4.1	3.4	3.6	9.9	11.4	10.5	9.1	41.0
Burlington, Vt	44 29	18	1.8	1.7	1.9	1.9	3.4	3.8	4.4	3.0	3.4	3.7	2.7	2.3	7.3	11.1	9.8	5.7	33.9
Amherst, Mass	42 22	17	3.0	2.8	3.0	2.9	3.9	3.4	4.2	4.3	2.8	4.1	3.6	3.9	9.8	12.0	10.5	9.8	42.0
New Bedford, Mass	41 42	40	3.2	3.3	3.6	3.5	3.7	2.7	2.7	4.1	3.3	3.5	3.9	3.7	10.8	9.6	10.7	10.3	41.3
New York (Erasmus Hall)	40 37	23	3.2	2.8	3.6	3.5	3.8	3.6	3.7	4.3	2.8	3.7	3.5	4.1	11.0	11.6	10.0	10.1	42.6
Albany, N. Y	42 39	27	2.8	2.6	2.8	3.1	3.8	4.5	4.4	3.4	3.3	3.7	3.2	2.9	9.8	12.3	10.3	8.3	40.7
Utica, N. Y	43 07	20	2.8	2.6	2.5	3.2	3.2	4.6	4.4	3.9	3.7	2.7	3.6	3.1	9.0	13.0	10.0	8.5	40.4
Rochester, N. Y	42 45	20	1.9	1.5	1.8	1.9	3.2	3.3	3.0	2.6	3.0	3.3	2.8	2.2	7.0	8.9	9.1	5.6	30.6
Philadelphia, Pa	39 57	28	3.3	2.8	3.5	3.3	3.4	3.8	4.2	4.3	3.1	3.5	3.5	3.6	10.2	12.3	10.1	9.7	42.3
Baltimore, Md	39 17	16	2.6	3.3	3.9	3.4	3.3	2.9	3.5	4.2	2.9	2.6	3.6	3.9	10.6	10.7	9.0	9.8	40.1
Norfolk, Va	37 02	16	3.3	2.9	3.5	2.9	3.9	4.1	5.2	6.1	4.7	3.0	3.2	4.4	10.3	15.4	11.0	10.6	47.3
Savannah, Ga	32 05	14	2.6	2.6	4.2	1.9	5.7	4.7	9.4	9.3	4.9	3.1	1.7	3.2	11.9	23.4	9.7	8.4	53.4
Key West, Fla	24 33	14	2.0	1.2	2.3	1.1	3.1	3.5	2.4	3.3	4.8	5.1	1.6	1.3	6.5	9.2	11.5	4.5	31.8
Mobile, Ala	30 42	10	5.7	5.4	3.9	4.4	4.3	6.2	6.3	6.8	2.8	3.1	6.3	5.8	12.6	19.3	12.1	16.9	61.0
Huntsville, Ala	34 45	12	5.8	4.7	5.9	5.0	4.0	5.1	4.6	4.9	3.5	2.8	2.7	4.9	14.9	14.6	10.0	14.4	53.9
New Orleans, La	30 00	13	6.5	4.4	2.7	4.1	3.5	5.4	6.5	5.5	4.0	2.6	3.5	4.6	10.3	17.4	10.1	15.6	53.4
Matamoras, Mexico	25 57	3	1.9	1.9	1.0	0.6	2.4	2.7	1.8	1.9	4.8	4.9	2.5	4.1	4.0	6.4	12.3	7.8	30.5
Fort Gibson, Ind. Ter	35 40	16	2.0	2.3	2.3	4.3	4.3	4.4	3.3	2.8	2.2	4.2	3.3	2.2	11.0	10.5	9.7	6.5	37.8
Louisville, Ky	38 00	11	3.4	4.1	4.3	3.5	4.3	5.9	5.0	4.0	2.5	3.1	3.4	4.7	12.1	14.8	9.0	12.2	48.1
Cincinnati, Ohio	39 06	13	1.1	5.7	4.1	3.8	3.4	3.7	2.6	3.4	2.3	2.8	3.4	6.6	11.3	9.8	8.5	13.4	48.6
Marietta, Ohio	39 25	25	2.9	2.9	3.0	3.0	3.9	4.9	4.5	3.8	3.1	3.1	3.0	3.4	9.9	13.3	9.2	9.2	41.6
Detroit, Mich	42 19	9	2.0	1 6	2.9	2.8	2.3	3.1	3.1	2.1	3.2	1.5	2.0	1.8	8.0	8.4	6.7	5.4	28.4
St. Louis, Mo	38 37	16	1.9	2.2	3.5	4.0	4.6	5.6	3.8	4.0	2.4	3.0	2.8	2.7	12.1	13.3	8.3	6.8	41.1
Athens, Ill	39 55	10	2.3	1.9	2.9	4.9	4.4	6.9	3.2	3.1	3.8	2.5	2.9	2.8	12.2	13.3	9.2	7.1	41.8
Muscatine, Iowa	41 28	8	2.1	2.1	3.4	3.7	5.2	5.7	3.8	7.8	4.5	3.4	3.8	3.2	12.3	17.4	11.7	7.3	48.8
Milwaukie, Wis	43 03	7	1.3	0.8	1.6	2.4	2.5	4.0	3.0	2.8	3.2	1.4	2.1	2.0	6.6	9.7	6.8	4.2	27.2
Mackinac, Mich	45 51	8	1.2	0.6	1.4	1.2	2.1	1.4	2.9	2.1	3.0	2.1	2.3	1.2	4.7	6.4	7.4	3.0	21.5
Fort Snelling, Min	44 58	15	0.8	0.6	1.4	2.3	3.2	3.4	3.9	2.9	3.1	1.2	1.4	0.6	6.8	10.2	5.7	2.0	24.8
Fort Leavenworth, Mo	39 25	16	0.8	1.4	2.3	3.6	4.0	6.3	3.6	3.2	3.0	2.4	1.7	1.0	9.9	13.1	7.1	3.3	33.4
West of the Rocky Mountains.																			
Albuquerque, N. M	35 13	3	0.1	0.6	0.3	0.3	0.1	2.8	0.5	2.3	0.3	0 3	0.6	0.3	0.6	5.6	1.3	0.9	8.4
San Diego, Cal	32 41	2½	0.3	1.7	1.1	0.9	0.5	0.0	0.0	0.2	0.0	0.1	1.5	3.4	2.5	0.1	1.6	5.4	9.6
San Francisco, Cal	37 48	3 1-12	1.7	0.5	4.4	2.1	0.4	0.0	0.0	0.0	0.4	0.6	3.0	5.5	7.0	0.0	4.0	7.8	18.8
Cantonment Far West, Cal	39 02	3	3.3	0.6	6.4	2.2	0.9	0.0	0.0	0.0	0.3	0.1	3.5	4.6	9.5	0.0	3.9	8.6	21.9
Astoria, Oregon	46 11	1 1-12	27.0	10.9	6.1	4.4	5.9	2.6	0.0	2.3	1.9	6.7	13.2	6.2	16.4	4.8	21.8	44.1	87.2
Puget's Sound, Oregon	47 07	3 1 6	11.8	3.9	4.7	4.1	0.8	0.6	0.5	1.3	1.6	3.6	5.9	6.1	9.5	2.4	11.1	21.7	44.8
Sitka, Russian America	57 03	2	2.5	9.6	3.5	3.3	1.9	5.9	3.7	10.1	14.8	12.7	7.4	4.2	8.7	19.7	34.8	16.4	79.5

Amount of rain in the temperate latitudes of the Eastern Continent, (inches and hundredths of mean vertical depth.)

Places.	Latitude.	No. of years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Aberdeen, Scotland	57° 09′	4	2.63	2.15	2.24	1.00	2.19	2.33	2.36	2.41	3.26	3.00	2.69	2.61	5.43	7.10	8.95	7.39	28.87
Hereford, Central England	52 00	24	2.27	2.35	1.81	2.30	2.07	2.36	2.79	2.38	2.88	3.18	3.41	2.85	6.18	7.53	9.47	7.47	30.68
Gosport, S. England	50 50	26	2.58	2.21	2.03	2.24	1.92	1.75	2.57	2.34	3.21	3.25	3.73	3.22	6.19	6.66	10.19	8.01	31.05
London, E. England	51 30	9	1.81	1.74	1.50	1.44	1.98	1.60	2.22	2.62	2.32	3.46	2.71	1.45	4.92	6.44	8.49	5.00	24.87
Armagh, N. Ireland	54 20	12	3.75	2.88	2.42	2.22	2.23	2.86	3.19	2.82	2.58	3.48	3.35	2.97	6 87	8.87	9.41	10.97	36.12
Brussels, Belgium	50 50	6	2.82	2.11	2.19	1.26	2.26	2.75	3.44	2.63	2.46	2.96	2.79	2.27	5.71	8.82	8.22	7.20	29.96
Paris, France	48 50	30	1.62	1.41	1.65	1.60	1.66	1.28	2.14	1.92	1.86	2.42	1.85	2.24	4.91	5.34	6.13	5.27	22.66
Bordeaux, France	44 50	6	3.51	3.65	2.57	2.88	1.79	2.49	1.35	3.55	2.69	4.24	3.44	1.81	7.25	7.39	10.34	8.98	33.99
Alais, S. France, (near Marseilles)	44 12	35	3.42	2.42	2.41	3.32	3.55	1.79	2.05	1.73	5.21	5 53	4.39	3.19	9.28	5.58	15.13	9.03	39.02
Marseilles, S. France	43 18	20	1.45	2.01	1.10	1.75	1.82	0.74	0.40	1.03	2.03	3.35	2.71	1.77	4.67	2.17	8.09	5.23	20.16
Dijon, E. France	47 20	20	2.39	2.02	1.92	2.52	2.63	2.76	2.05	2.69	2.61	3.32	3.34	2.89	7.07	7.49	9.27	7.31	31.15
Geneva, Switzerland	46 12	5	2.00	1.00	1.42	3.94	2.58	3.89	2.85	4.01	3.74	4.83	2.53	0.97	7.95	10.76	11.11	3.95	33.77
St. Bernard, Alps, 7,670 feet above the sea	45 50	12	9.12	6.99	5.45	6.29	5.27	3.94	2.92	2.69	5.66	7.81	7.09	5.56	17.02	9.56	20.57	21.56	68.81
Lausanne, Switzerland	46 30	8	2.00	2.82	2.57	1.78	3.07	4.61	3.72	5.06	2.84	5.13	2.88	2.01	7.42	13.39	10.85	6.83	38.49
Milan, Italy	45 28	68	2.84	2.08	2.25	3.07	3.73	3.17	2.94	3.07	3.27	4.33	4.13	3.13	9.05	9.18	11.73	8.05	38.01
Rome, Italy	41 54	40	3.41	2.20	2.63	2.29	2.35	1.67	0.72	1.00	2.13	4.66	4.10	3.70	7.27	3.39	10.89	9.31	30.86
Naples, Italy	40 52	14	3.15	2.79	3.12	2.38	1.74	1.48	0.57	0.88	2.43	4.24	3.85	3.01	7.24	2.93	10.52	8.95	29.64
Catania, Sicily	37 30	8	3.66	2.26	4.12	2.27	0.90	0.33	0.13	0.17	2.01	5.12	3.33	3.83	7.29	0.63	10.46	9.75	28.13
Venice, E. Italy	45 26	7	2.13	1.83	1.43	3.03	4.41	2.95	2.89	2.64	3.44	2.20	3,78	2.15	8.87	8.48	9.42	6.11	32.88
Udine, N. E. Italy	46 03	16	4.56	3.25	4.53	5.65	4.58	7.28	6.68	5.02	6.05	7.59	6.10	5.61	14.76	18.98	19.74	13.42	66.90
Manheim, Rhine	49 29	12	1.63	1.14	1.44	1 95	2.04	2.69	2.45	2.15	2.17	1.98	1.50	1.33	5.43	7.29	5.65	4.10	22.47
Berlin, Germany	52 30	?	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20.57
Prague, Germany	.....	4	0.50	1.26	0.71	0.83	2.26	0.48	1.39	3.76	1.46	1.54	1.85	0.36	3.80	5.63	4.85	2.12	16.40
Vienna, Germany	48 13	?	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.55
Copenhagen	55 30	17	0.95	0.99	0.72	0.93	1.19	1.72	2.32	2.82	1.87	1.57	1.69	1.58	2.81	6.86	5.13	3.52	18.35
Stockholm	59 21	8	0.93	0.39	0.35	0.40	1.42	1.54	2.29	3.98	3.07	1.99	1.88	1.43	2.17	7 81	6.94	2.75	19.67
St. Petersburg	59 56	4	1.40	0.92	1.31	0.45	1.44	2.03	1.79	1.87	1.25	1.97	1.48	1.57	3.20	5.70	4.71	3.89	17.51
Bergen, Norway	60 00	10	7.76	7.35	7.26	4.54	3.96	4.94	5.23	8.43	10.93	8.25	10.57	8.39	15.76	18.60	29.75	23.50	87.61
Simferopol, Crimea	44 57	5	0.67	0.46	1.01	0.73	1.47	2.66	2.77	0.58	1.52	0.87	1.01	1.07	3.22	6.01	3.40	2.20	14.83
Orel, E. Russia, in Europe	52 58	4	2.17	1.28	2.74	1.40	2.23	2.34	3.01	3.15	0.79	1.94	1.89	1.70	6.37	8.50	4.62	5.15	24.64
Barnaoul, Russia in Asia	53 20	4	0.49	0.30	0.92	0.26	0.87	1.10	1.34	2.54	0.79	0.48	0.81	0.33	1.35	4.98	2.08	1.13	9.54
Pekin, China	40 00	4	0.03	0.24	0.16	1.24	1.95	4.39	8.72	5.69	2.05	0.75	0.20	0.27	3.35	18.80	2.99	0.54	25.68

The general comparison of the two continents shows that we have here *much more rain* both for the same latitudes and the same temperatures. The distribution of this amount is also remarkably equal through the various months for both continents for all but the warmest districts, and in these the maximum is in summer.

For the northern portions of both continents, or for those having the least mean annual fall, the distribution is still further equalized by embracing a much larger number of days, on which some precipitation occurs, in any month, as a rule, than in the districts giving a larger amount. This is the principal fact of importance which is not apparent from a mere inspection of the tables.

The distribution of rain on this continent for the months of summer is singularly favorable. In districts where the winter amounts fall off to an inconsiderable quantity, as at Fort Snelling, and in the western and northern interior generally, the summer precipitation is ample, and well distributed. It is not, as in Europe, the per-centage merely that remains large, but the absolute quantity; as 13 inches at Fort Leavenworth and 10 at Fort Snelling for the three summer months, are quantities fully equal to those of any part of the continent eastward in the same latitudes. This summer distribution so far in the interior of the continent, on the ample scale corresponding to its fervid heats, is without any parallel elsewhere, and it renders the vast valley tributary to the Mississippi and St. Lawrence the most favored of climates for abundant vegetable production.

References to the more precise distribution of rain beyond this are generally necessary in considering the range of particular productions, and need not be further referred to here.

The statistics of rain at European stations are extremely meagre, it should be said, however, and the limited number of full records of rain measurement hitherto published renders it difficult to represent even the well-observed climates. The proportion of rain for the separate seasons as compared with the year, has often been given instead of definite amounts, and no general collection of these records appears ever to have been made, as has been so amply done in records of temperature.*

GENERAL CHARACTER OF THE INTERIOR AND PACIFIC CLIMATES.

Many features of the whole mass of the continent west of the great plains, or of the eastern limit of the Rocky mountains, may be designated as common to all its cultivable districts, except, perhaps, a narrow belt of the immediate coast north of the 42d parallel of latitude. These chief features are its aridity, both in the per-centage of humidity of the air generally, and in the absolute amount of rain and snow; its great extremes of temperature in the season affecting vegetable growths; its unusual or abnormal winds at all seasons, and its peculiarly local

* By referring to the Philosophical Transactions of the Royal Society of England, it will be seen that a very complete series of observations on the fall of rain and snow, with other phenomena, were made towards the close of the seventeenth century, and subsequently, in Great Britain, as well as on the Continent, full accounts of which are therein published.

D. J. B.

distribution of all these conditions and extremes. There are striking proofs of the truth of these positions in almost every district, and some points of their general relation to agricultural prosperity can be easily indicated.

These principal conditions control acclimatization or adaptation of staples, and so decisively as to separate the two portions of the continent. As a whole, the characteristic American staples which distinguish the United States east of the plains as the most productive area of any continent, cease to flourish on the Pacific side. Corn, cane, cotton, tobacco, hemp, &c., which in the Central and Eastern States flourish abundantly, though elsewhere tropical or semi-tropical, are so far limited and irregular as to preclude their successful production as great staples on the Pacific coast.

Small grains, however, find many extremely favorable districts, and, as a whole, are highly successful. Next are the grasses, roots, and annuals adapted to arenaceous soils, and to the alternations of wet and dry seasons; and at last, locally, a greatly variable and peculiar range from tropical to north temperate productions in some single localities and peculiar exposures.

The general guides to productive capacity, which may be so readily followed on the eastern half of the continent, fail on the western half. The distribution of temperature and fall of rain and snow are unmistakable in the first case, and may be relied on as decisive of great capacities of production. In the last case, the distribution of temperature generally, or for the mean of months or seasons, is very favorable for the interior, considering its elevation above the sea; yet it has not, as exhibited in the isothermal lines, the same significance in productive capacity, or in absolute thermal condition, as on the eastern half of the continent. For this there are two reasons: one in the range of single and monthly extremes of temperature, and the other in the general aridity of this class of climates; the last of which reduces the thermal effect below its absolute measure by the thermometer. Thus a mean temperature of 80° for a summer month, with a very low per-centage of humidity and without rains, would probably, though the precise measure of relations is not known, be little above the mean temperature of 70° in the humid atmosphere of the Ohio valley or on the Atlantic slope of the Alleghanies. In confirmation of this view of the measure of difference due to aridity, the known, or so far as known, productive capacity of the valley of the Great Salt Lake, Utah, is scarcely greater in any thermal measure than that of the States of Michigan and Wisconsin, the south shore of Lake Erie, and other districts in the line of the July isothermal of 70°. Careful observations by Captain Stansbury give a mean temperature of 80° for the same month at Great Salt Lake city. In the more precise measures of summer thermal effect, as shown in the growth of vegetation requiring high temperature and of a semi-tropical range, the Salt Lake valley only equals the eastern districts referred to for two or three months, for which the mean temperature is several degrees higher, and it falls below them for productions requiring a greater number of months to mature.

These general distinctions embrace the extreme south of California, and much of Mexico also. They are conspicuous in the valley of the

Rio Grande, and do not change until the district of summer rains is reached in Mexico southward. With tropical summer temperatures in districts of Southern California and New Mexico, therefore, we have but semi-tropical fruits and staples, except in a few localities of peculiar position in Southern California. As a most distinctive mark of difference, the production of Indian corn may be cited. This passes but little beyond the 35th parallel of latitude for this western mass of the continent, and it has as great a measure of success to near the 44th parallel for the Eastern and Central States.

The reverse range of wheat and the associated Cereals is equally striking as a mark of distinction between these classes of climates. At the east the heat and humidity are too great for those in the Mississippi valley south of 38° north latitude, and for all districts south of 35°. For the western climates they reach the 30th parallel without regard to elevation, and continue on the arid table-lands of Mexico indefinitely southward. For the degree of fertility characterizing their soils, all the Pacific and interior climates have the highest capacity for these grains; and so far as climate may influence them, they are wholly exempt from the risks incurred in the Eastern States.

The climates of the interior and Pacific present new conditions and new adaptations in reference to a class of vegetable growths of the greatest importance after grains, and after the few more important single staples. In grasses, it is certain that those previously known as cultivated cannot be produced there to any considerable extent; but the peculiarities of condition in this respect are met in the natural growths most abundantly, and these native grasses may perhaps be adapted to all the requirements of cultivation and occupation as fully as they are to the requirements of the present uncultivated state of the country. On this point there is much to be learned of the cultivation and adaptation of the grasses characteristic of arid plains generally, and of the capacity of our native grasses in this respect. We can only say now that the English cultivated grasses have but a small place in those climates, and that the natural grasses present remarkable adaptation and value. Of their power of transition to the cultivated state, little is yet known.

The peculiarly local character of these western climates, as a class, is a most important general feature. Abrupt contrasts of elevation and exposure, and consequently of humidity, winds, temperature, and fall of water, are not the sole causes of this distinction, since conditions extraneous to these irregularities of mass and surface exist which modify the characteristics as a whole. The refrigeration of the western coast in summer is due to other causes than the interior aridity and rarefaction, the greatest of which is the presence of an extraordinarily cold mass of the North Pacific waters off the coast. Summer and winter are therefore both modified, and approach very nearly in temperature, and this peculiarity of sea influence, in connexion with the great elevation of the interior mass, exaggerates the local contrasts which would otherwise be found on its irregular surface.

VALLEY OF THE SALT LAKE, UTAH.

The climate of this valley is anomalous in many respects. It is a great interior depression, yet near enough to the Pacific to feel the gen-

eral amelioration of Pacific climates, and locally isolated so much as to give a variability and range very much like that of the eastern part of the United States in the same latitude. Its elevation above the sea of four thousand feet, and the proximity to mountains on every side, render it liable to single extremes of temperature more prejudicial to many staples than in the Atlantic States. Indian corn does not succeed in consequence of early and late frosts, and the chills brought suddenly upon the valleys by local storms. Tobacco, the vine, and other equally delicate fruits and plants, would also fail here, though the mean temperature of June, July, and August is nearly that of Philadelphia. The winter months are but little colder than those of the same latitude at the East, thus giving the elevation of four thousand feet, and its measure of decrease of temperature as the measure of greater heat on this western mass of the continent when compared with the eastern portion. The rule of decreasing temperature in abrupt elevations would not probably obtain for this great interior mass. Four or five hundred feet for each degree would more correctly represent this decrease than any less number, and ten degrees on the mean of a month constitute the full measure of diminished temperature in the Salt Lake valley as compared with the coast of the Pacific at the level of the sea. This is also very nearly the measure of contrast between the opposite coasts of the continent for the winter months.

With a monthly curve and an absolute mean of monthly temperatures, therefore, very nearly the same that the same latitude on the Atlantic coast gives, the peculiar position of the Salt Lake valley gives it single extremes and anomalies which render the production of the more delicate staples and fruits of the whole of the continent east of the Rocky mountains—and which extend here almost to the extreme northern limit of the United States—quite impossible. The hardy Cereals and hardy growths of every sort are, however, unusually successful, and the cultivable portion of the country richly productive to this extent.

The upper and interior valleys of Oregon are, so far as known, very similar to this interior basin in thermal distribution, and quite the same in their cultivable capacity. In a few instances only, and probably in no decided degree, is the growth of Indian corn successful.* Further north the valleys and plains are lower than at the Salt Lake, and also nearer the Pacific, and more directly influenced by its climate. Their temperature conditions are not less favorable than at Salt Lake, therefore, and quite near the Pacific the winter is far more favorable.

Precipitation in rain and snow is extremely irregular in Salt Lake valley, and quite inconsiderable in amount for the summer. Irrigation is indispensable to cultivation; though the facility with which this may be effected, removes much of the actual difficulty presented by this feature of the climate. A uniform and considerable humidity of the atmosphere is probably necessary to many plants, though we are yet unable to say what plants would fail to be perfectly produced in an arid atmosphere and by irrigation alone. The difference of temperature which would be the equivalent of this aridity, in its influence on

* This assertion does not seem to accord with the statement of Mr. Macy, on page 119 of this Report, nor with the census returns of 1850. D. J. B.

vegetable and animal life, cannot be precisely stated. It must be some four or five degrees on the mean of each summer month, however, and may be much more. Thus the mean at the Salt Lake, of 71° for June and 80° for July, should probably be reduced five to eight degrees for each, to compare with the Atlantic and Central States; and the range of single extremes is so great, that the temperatures of 65° for June and 72° for July somewhat overmeasure the capacity for delicate growths, requiring several months to attain perfection.

Capacity of the American climate for the staples now cultivated.

MAIZE, OR INDIAN CORN.

In a specific examination of the range of each of the important staples now cultivated in the United States, Indian corn has the first rank, as a native of the American climate itself, and still its most important single product. Its wide and wonderful range is due, in part, to a peculiar elasticity of the plant, different from that controlling in adaptation in almost every other, and which permits its compression within a very brief period of growth. It seems to be restricted to but one condition, rigidly, which is the temperature of the period in which it ripens; and this is less than that required for every other plant, for the growth of which the same temperature is necessary.

The three summer months are the extent of this requirement in time;* and the thermal distribution on this continent is such, that every portion of it, almost to the limit of cultivation at the north, gives the necessary summer heat. The most important exception is a narrow line of the Pacific coast, and to this there is a general addition of some of the more considerably elevated localities in mountainous portions. Even in the valley of the Red river of the North, at the 51st parallel of latitude, a small variety may be successfully grown; and in the St. Lawrence valley the same cultivation may be carried to the 47th parallel.

Its profitable cultivation as a staple, and in competition with the best products of the several districts, is more important to practical interests, however. Its limit, in this respect, is very precisely defined on the north by a mean temperature of 68° for July. Southward there is no limit, as the plant is thoroughly tropical.

In this general view it occupies all except the more elevated or mountainous portions of Maine, New Hampshire, Vermont, Canada West, Wisconsin, and Minnesota. Northern New York, in addition to this list, completes the districts in which the elevation seriously interferes with its most successful cultivation; and the remaining portions of the continent east of the Rocky mountains form an unbroken area

---

* For the extreme northern limit of this growth, the time is so much less as to deserve special mention. From the statements of Schoolcraft and others, it there "ripens early in August," and does not begin its growth till near the middle of June. Less than two and a half months, therefore, suffice to perfect this grain there.

in which, so far as climate is concerned, corn ranks first in its capacity for production of nutritive matter in some form.

The maximum capacity of this singular production is also much nearer its northern than its southern limit, and is, indeed, in the States where extremes of temperature may cut off or seriously injure it at times. Wisconsin, Northern Illinois, Michigan, Central New York, and the southern part of New England, produce, under favorable conditions, an amount of value from the growth of this plant which largely exceeds any other possible product of vegetable life. Six or seven times the average amount of the grain it yields in Florida, and in other countries of which it seems a native, may be grown at this northern limit; and the proportion of nutritive matter of the stem and leaves of the plant is in nearly the same excess.* This is, perhaps, the most important point in which an investigation of its climatic range may aid our older States; and it shows that, with the increase of value in Southern lands and the introduction of staples which find their full value in the market, and which cannot have a similar or great range, the cultivation of corn must be transferred northward. The whole country south of 33° north latitude, and as far west as Central Texas, can produce more value in its own peculiar staples under proper acclimatization and with proper cultivation. The cane is more decidedly than anything else the natural successor of Indian corn in semi-tropical districts. Its analogies of growth and development of saccharine matter are nearly the same, and with the greater heat and humidity of some portions of the United States the product of grain appears to fall off, and corn loses its extraordinary power of expansion and excessive production. It is highly probable that the introduction of the best possible staples in our warmer districts will furnish advantageous substitutes for maize, and transfer its cultivation to the more productive districts further north. With this transfer northward of the line of 33° of latitude, which seems the border of the more particularly warm and humid regions, there will yet remain a larger area devoted to maize as its chief staple than that appropriated to any other single product whatever.

There is, however, greater practical importance in the examination of the western half of the continent in respect to its adaptation to this staple. Many parts of the interior and western coasts are little known, and singular anomalies certainly exist in many places. At the westward of the Mississippi, and to latitude 44° north, the highly favorable character of the immediate valley of that river is continued without interruption so far as climatic adaptation is concerned, and this, notwithstanding a constant increase of elevation westward, ultimately amounting to near five thousand feet above the sea at the eastern base of the Rocky mountains. The whole plain preserves the same high

* The writer here appears to be laboring under an error, as it is clearly stated, on pages 240 and 241 of the present Report, that the amount of tobacco raised per acre in the valley of the Connecticut, in several instances, last year, exceeded $300, which is more than three times the value that could have been produced in corn. Again, it will be seen, on page 94, that Dr. Weller, of North Carolina, actually made, last year, 73¾ bushels of corn to the acre, and would have far exceeded this amount had not his crop been injured by wet and drought. Furthermore, the planters in the West Indies often obtain 20 or 30 bushels of corn to the acre without manure, and two crops in a year, if necessary, from the same land. D. J. B.

summer temperatures, although on its northern border the summer is somewhat shorter, its measure of heat is at least equal for the time, and its adaptation to this crop quite similar, so far as known, to that of the country east of the Mississippi.

The same liability to frosts and to injurious extremes of temperature which exists east of the Mississippi seems also continued over these great interior plains, though with a decreasing range towards the western border. The singular anomaly is found also of higher temperatures on the western than on the eastern border, and this, too, notwithstanding the greatly increased elevation. The most injurious range of extreme temperatures is east of the central portions of the plains, and at 45° to 47° of latitude these become nearly decisive against the growth of Indian corn.

Similar temperature extremes sometimes strike across the high plains of Wisconsin, Illinois, and Indiana; but the injury is remarkable rather than considerable, and it does not practically interfere with cultivation.

It is more remarkable that at the western border of the plains, as at Fort Laramie, at 4,500 feet elevation, the spring and autumn should be as mild and equable as at the Mississippi river in the same latitudes; and more favorable than at Forts Kearney and Leavenworth, on the eastern side of the plain, and much lower and much further south.

Over the whole of this great interior that is not abruptly mountainous, the adaptation of climate to the growth of this staple continues highly favorable, notwithstanding its great elevation. The difference of three degrees of latitude and of nearly four thousand feet elevation between the stations just contrasted effects no material change in this adaptation.

At the mountains, however, and beyond them, important contrasts occur. In the plateau next the Rocky mountains, or first in the class of considerable plains after passing these mountains from the east, the general temperature is very high in summer for the latitude and elevation. The mean temperatures here show a fair adaptation to the growth of Indian corn. Eastern Oregon and the valley of the Great Salt Lake, with the upper valleys of the Grand and Green rivers, and of the Rio Grande, are all within the temperature limits found to be perfectly congenial to this growth in the Eastern United States. We find the result, however, much influenced, and for many districts entirely controlled, by local causes, or by the general cause of great elevation and proximity of mountains, giving local and irregular changes of temperature. Generally, also, the daily range of temperature is very great; and when absolute frosts do not occur, the great daily changes of temperature affect this cultivation injuriously.

Such are obviously the characteristics of all the districts just mentioned, though only a small portion of the Rio Grande valley is included in this description, and of the Grand and Green rivers (Colorado of California) only the portions north of 38° of latitude. Reference to the temperature tables will show that the summer means for these districts are sufficiently high, and the peculiarity which influences the condition can only be exhibited in a table of monthly extremes, in connexion with one giving the measure of the daily changes, or the curve in successive hours, as far as this may have been observed.

Lowest temperatures observed in 1851—*monthly.*

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Pacific climates.												
San Diego (1850)	34	40	39	45	50	56	58	62	51	50	37	29
San Luis Rey	40	36	39	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monterey	.....	.....	.....	.....	.....	.....	46	50	53	48	44	40
Benicia	33	32	38	43	50	52	51	53	51	52	41	37
San Francisco	30	33	34	42	45	49	47	50	50	47	40	35
Astoria	28	31	32	42	46	50	54	54	48	.....	.....	.....
First interior valleys.												
Puget's Sound	24	24	26	31	40	46	46	46	40	39	29	22
Columbia Barracks	19	19	27	.....	.....	.....	.....	.....	.....	.....	.....	22
Cantonment Far West	29	26	33	38	37	45	53	52	49	44	32	29
Fort Miller	.....	.....	.....	.....	.....	.....	.....	61	56	46	37	32
Camp Yuma	30	19	32	48	.....	.....	.....	.....	.....	.....	.....	.....
Interior.												
El Paso, Fort Fillmore	22	26	32	52	60	68	70	72	52	32	14	18
Socorro	10	12	.....	32	42	.....	62	60	.....	30	5	11
Doña Ana	.....	.....	.....	.....	43	52	66	65	.....	.....	.....	.....
Albuquerque	8	7	12	23	35	43	57	.....	.....	.....	.....	.....
Cebolletta	9	2	20	27	43	53	62	60	54	45	30	34
Santa Fé	5	—2	.....	20	34	39	50	45	41	.....	15	15
Las Vegas	—7	—14	14	30	34	47	50	.....	.....	.....	.....	.....
Great Salt Lake (1850)	9	10	7	26	39	40	59	62	.....	.....	.....	.....
Fort Laramie	—5	.....	15	15	30	42	53	56	47	20	14	—14
Fort Kearney	—3	2	.....	24	28	48	54	46	33	16	10	—7

Lowest temperatures observed in 1852—*monthly.*

Pacific climates.												
San Diego	38	40	36	40	44	58	60	62	49	45	38	34
Monterey	36	42	36	38	46	47	52	.....	.....	.....	.....	.....
Benicia	34	39	39	.....	40	53	54	55	50	48	36	32
San Francisco (1853)	41	42	41	46	47	49	50	51	50	49	44	40
Port Orford	.....	.....	.....	.....	.....	46	46	48	40	41	38	30
First interior valleys.												
Puget's Sound	25	29	19	26	38	41	49	45	38	35	28	0
Columbia Barracks	22	29	21	31	39	47	.....	.....	.....	38	30	5
Fort Reading	.....	.....	.....	36	.....	54	.....	56	39	35	31	28
Fort Miller	32	36	29	38	41	68	.....	55	50	41	34	28
Rancho del Chino	35	39	36	45	44	56	56	58	.....	.....	.....	.....
Interior.												
Fort Fillmore	14	21	15	26	41	55	54	56	56	30	21	15
Fort Webster	.....	20	18	28	26	50	50	44	46	26	16	12
Valverde	4	18	24	26	35	45	55	60	41	32	18	14
Santa Fé	.....	.....	.....	.....	.....	.....	.....	.....	34	27	14	10
Fort Laramie	—13	—4	—2	14	34	47	55	53	28	21	5	—11
Fort Kearney	—28	—10	0	13	22	44	55	54	27	20	10	—19
Fort Leavenworth	—14	9	16	27	38	44	58	58	39	22	16	1
Fort Ripley	—36	—14	—16	2	28	34	38	36	27	20	—8	—36

Lowest temperatures observed in 1853—*monthly.*

Pacific climates.												
San Francisco	41	42	41	46	47	49	50	51	50	49	44	40
Benicia	34	36	34	42	46	52	50	50	52	49	44	32
Port Orford	32	33	30	40	42	.....	.....	.....	.....	.....	.....	.....
Partially interior.												
Fort Yuma	37	36	40	52	52	61	76	76	69	50	45	36
Fort Vancouver (Col. Bar.)	25	19	21	33	40	47	50	43	42	28	31	26
Puget's Sound	25	20	22	34	35	47	44	43	38	29	27	23
Dalles	19	10	22	33	36	43	46	47	46	25	22	26
Interior.												
Santa Fé	15	7	16	29	37	40	54	53	46	22	25	7
Fort Defiance	7	6	11	22	20	35	52	46	36	17	13	6
Fort Union	10	2	6	27	32	39	44	46	37	14	18	11
Fort Massachusetts	—6	—8	8	19	17	30	39	39	26	.....	.....	.....
Fort Laramie	11	—4	9	32	33	49	59	55	36	20	22	13
Fort Kearney	—5	—8	—1	29	30	53	50	37	36	12	9	—16
Fort Leavenworth	—1	—3	12	33	38	56	58	49	44	22	22	8
Fort Ripley	—22	—35	—16	18	29	33	43	42	32	4	0	—21

Minimum temperatures in California, arranged for successive years, at the same station.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Fort Yuma.												
1851	30	19	32	48	.....	.....	.....	.....	.....	.....	.....	.....
1853	37	36	40	52	52	61	76	76	69	50	45	36
San Diego.												
1850	34	40	39	45	50	56	58	62	51	50	37	29
1851	32	34	34	.....	.....	.....	.....	.....	.....	.....	37	36
1852	38	40	36	40	44	58	60	62	49	45	38	34
San Luis Rey.												
1851	40	36	39	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rancho del Chino.												
1851	.....	.....	.....	.....	.....	.....	55	58	51	47	36	36
1852	35	39	36	45	44	56	56	58	.....	.....	.....	.....
Monterey.												
1850	.....	.....	.....	.....	.....	.....	46	.....	.....	.....	.....	.....
1851	.....	.....	.....	.....	.....	.....	46	50	53	48	44	40
1852	36	42	36	38	46	47	52	.....	.....	.....	.....	.....
San Francisco.												
1850	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28
1851	30	33	34	42	45	49	47	50	50	47	41	35
1852	35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1853	41	42	41	46	47	49	50	51	50	49	44	40
Sonoma.												
1851	31	32	32	38	.....	.....	.....	.....	.....	.....	.....	.....
Benicia.												
1851	33	32	38	43	50	52	51	53	51	52	41	37
1852	34	39	39	.....	40	53	54	55	50	48	36	32
1853	34	36	34	42	46	52	50	50	52	49	44	32
Fort Miller.												
1851	.....	.....	.....	.....	.....	.....	.....	61	56	46	37	32
1852	32	36	29	38	41	68	.....	55	50	41	34	28
Cantonment Far West.												
1851	29	26	33	38	37	45	53	52	49	44	32	29
Fort Reading.												
1852	.....	.....	.....	36	.....	54	53	56	39	35	31	28

*Extreme low temperatures on the interior plains.**

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Pembina, Red river Valley.												
1852	—36	—39	.....	—3	.....	50	54	54	.....	.....	.....	.....
1853	.....	.....	.....	20	.....	.....	.....	.....	.....	.....	.....	.....
Fort Gaines, (Ripley.)												
1850	—26	—28	—20	2	24	35	46	42	22	18	9	—26
1852	—36	—14	—16	2	28	34	38	36	27	20	—8	—36
1853	—22	—35	—16	18	29	33	43	42	32	4	0	—21
1854	—50	—26	—4	—7	.....	.....	.....	.....	.....	.....	.....	.....
Fort Leavenworth.												
1850	.....	—11	9	28	32	55	60	53	49	27	18	—3
1851	1	3	22	25	31	48	59	61	43	25	18	—6
1852	—14	9	16	27	38	44	58	58	39	32	16	1
1853	—1	—3	12	33	38	56	58	49	44	22	22	8
1854	—8	6	19	15	.....	.....	.....	.....	.....	.....	.....	.....
Fort Kearney.												
1850	—2	—7	9	21	26	49	54	47	40	14	6	—12
1851	—3	2	.....	24	28	48	54	46	33	15.5	10	—7
1852	—28	—10	0	13	32	44	55	54	27	20	10	—19
1853	—5	—8	—1	29	30	53	50	37	36	12	9	—16
1854	.....	2	16	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Laramie.												
1851	—5	.....	15	15	30	42	53	56	47	20	14	—14
1852	—13	—4	—2	14	34	47	55	53	28	21	5	—11
1853	11	—4	9	32	33	49	59	55	36	20	22	13
1854	—21	8	21	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cantonment Loring, (Fort Hall.)												
1850	—6	—8	—28	26	.....	.....	.....	.....	.....	.....	.....	.....
Great Salt Lake City—Capt. Stansbury.												
1850	9	10	7	26	39	40	59	62	.....	.....	.....	.....

At the coast of the Pacific we find a peculiar summer climate. The absolute mean temperatures fall very low for the summer months along the whole coast from San Diego to Puget's Sound. In this whole range no month attains a mean temperature of 65°, or the lowest permitting the growth of Indian corn. From the sea to the coast range of mountains the temperature is less than 60° for the mean of July; and where this coast range is low, the interior participates considerably in this low temperature as far as the principal mountain ranges. The Sacramento and San Joaquin valleys are, indeed, nearly all that have a sufficiently high and equable summer temperature, or one great enough to render the curve of daily change unimportant as an obstacle.

The high curve of heat for the day, so necessary to the perfect development of this vegetable, is that which is wanting on this coast. The night and morning are warmer than in many Eastern States where the warm mid-day perfects it fully, yet they avail nothing for its growth; it produces neither saccharine matter nor grain without this high mid-day heat, and with it seems to be less important that the temperature of the night is quite low, both comparatively and absolutely. There is no

* This mark — before a number indicates the degrees below zero of Fahrenheit.

plant in our cultivation less elastic, in this respect, and it is quite impossible to carry it where the midday and midsummer heats are not comparatively great. The measure of the curve of daily change of temperature for the districts of its most successful growth, and for those on our own continent, in which its success is doubtful, would much assist these comparisons.

There remain but the mountainous districts of Southern California and New Mexico for which to indicate the climatic adaptation of this staple. In these districts the local characteristics largely predominate, and control almost every condition of climate. The only one properly designated as general, and as applicable to the whole region, is that of aridity, or a very low per-centage of atmospheric humidity; and this condition is least important to the growth of Indian corn. So far as experiment in all climates has shown, it appears wholly unimportant to this plant whether the air contains very little or a very large per-centage of humidity; the most diverse districts in this respect appear equally suited to it.

Wherever the temperature is sufficient, and either rains or irrigation supply water to the soil, this product is quite successful. Between the Sierra Nevada and the eastern border of the Llano Estacado, of Texas, the table-lands, valleys, and low plains, are, as a rule, destitute of rain. Cultivation is possible, therefore, only where irrigation is possible; and this great area from the thirty-eighth parallel of latitude southward affords cultivation only in the valleys capable of irrigation, and on the mountain-sides which arrest the rains. In repect to rains and humidity, the entire basin of the Great Salt Lake is similarly situated, though its lower temperature brought it within the list of climates in which extremes of temperature become injurious to this particular staple.

Some portions of the most elevated plains at the sources of the Colorado of California, the Del Norte and Arkansas rivers, are perhaps quite too cold for this growth, though the extent of this country known to be adapted to grasses and small grains, and yet known to be unfit for maize and its associates, is not great. It is also difficult to define the limits and divisions here. On the whole, the range of this singular staple is wonderful, and the thermal condition of the summer of this continent, on which it is based, is without analogy on the Eastern continent. So large an addition to the nutritive growths of one continent in contrast to the same latitudes and general temperatures of another, must give a great advantage in capacity for dense population. Of its relation to other cultivated plants and grains in the yield of nutritive matter, it is only necessary to say that its variable character and power of almost unlimited development promise great results from future attainments in the science of cultivation. No other grain product may be so accumulated and almost heaped upon the land by increased skill in mere cultivation.

GEOGRAPHICAL RANGE OF THE GROWTH OF INDIAN CORN ON THIS CONTINENT IN DIFFERENT LONGITUDES.

An expressive mode of representing the range of this staple is by the reference to extreme points on the several meridians of longitude

from the Atlantic coast westward; and though we have no abrupt limits at the south other than those of the continent itself, or none in climate at least, we shall find the measures of distance on these lines of longitude of some service.

The Bay of Fundy and the valleys of New Brunswick bring this cultivation up to the 46th parallel at from 64° to 67° of west longitude. In the highlands of Maine it falls off to less than 45°, and in New Hampshire to 44°; but then rises abruptly to 47½° at St. Ann's, near Quebec, at 72° west longitude. The mountainous parts of New York and some parts of Canada West, between the Ottawa river and Lake Huron, permit no cultivation of this sort; but the river valleys and better portion of the country have some adaptation to it to the 46th degree of latitude, as far west as Lake Huron, at 82° west longitude.

The influence of the lakes and the elevation reduce the summer temperature so much at this point as to throw the limiting line southward to 45° of latitude, and this line continues west almost to the Mississippi. Passing this elevated district, and approaching the warmer summer of the plains, it goes abruptly north to 50° of latitude, at Lake Winnipeg, 97° west longitude. This is probably its highest point; and, measured on this meridian, we have 23° of latitude in the United States, and the whole amount of 35° for the North American continent, as the range of a single cultivated staple, and everywhere on this line it is at least equal to any other in value.

Westward of this line, the range becomes so irregular and exceptional between the extreme points, that the comparisons have not the same value. Localities of the upper Missouri permit some amount of cultivation to the base of the Rocky mountains, and to 47½° of latitude. On the west of these mountains, it reappears in the same latitude; and in the lower valleys of the north fork of the Columbia it goes to Fort Colville, near 49° of latitude. This is another extreme point of range; and though much the larger portion of this great elevated interior mass southward to New Mexico admits but a partial and imperfect cultivation, the climatic range is interesting at least. At 120° of longitude its range ceases for all latitudes on this continent; but between 97° and 120° the whole continent is embraced south of the points just named, and, with the exceptions mentioned, as belonging to all the Rocky mountain plateau north of New Mexico.

A brief reference to the European range will show the measure of contrast between the two continents in this respect. Africa is so entirely tropical as to have little place for Indian corn, though it is cultivated to some extent near the Mediterranean. In Europe, Spain, a small part of the south of France, Italy, the valleys of Austria and Hungary, and of Turkey, with the islands of the Mediterranean, comprise its range. In almost all these districts it is also quite subordinate to other staples, though imperfect cultivation may be one reason of this inferiority. Over the more densely populated and valuable portions of Europe it scarcely grows at all, and the little grown in France north of the mountains, and in Germany, Austria, and Russia, scarcely gives it any importance. Its climatological limit is so near here, that the more equable temperature conditions avail less in its extension than with the vine. The single element of greater heat for one month of

the summer is wanting; and so precise and imperative is the requirement in this respect, that no skill seems likely to acclimatise Indian corn in the more important European countries just named, and in the British islands.

Limiting districts in the cultivation of Indian corn in the North American climate northward.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Albion Mines	18.8	19.4	27.1	37.3	48.5	58.3	66.1	65.6	56.3	46.5	36.0	23.7	37.6	63.3	46.3	20.6	42.0
Frederickton	17.0	24.0	33.0	40.0	(?)37.0	48.5	65.5	69.7	61.5	47.5	31.0	13.5	36.7	41.2	46.7	18.2	40.7
Houlton	14.7	16.5	36.0	39.6	50.4	60.2	65.1	64.5	52.0	40.8	29.1	15.8	38.6	63.3	40.6	15.7	39.6
Quebec	9.9	12.8	24 4	38.7	52.9	63.7	66.8	65.5	56.3	44.1	31.5	17.3	38.6	65.3	44.0	13.3	40.3
Fort Coulonge	11.6	15.7	28.7	40.6	54.4	65.4	69.4	66.5	56.3	45.0	31.3	17.0	41.2	67.1	44.2	14.7	41.8
Malone	22.3	23.2	32.7	46.6	53.4	62.1	66.7	66.2	57 3	46.5	35.4	25.8	44.2	65.0	46.4	23.8	44.8
Fort Mackinaw	19.6	17.5	25.8	36.8	47.0	56.9	64.8	64.0	55.5	44.0	33.9	22.3	36.5	61.9	44.5	19.8	40.7
Fort Brady	17.4	16.7	25.7	38.5	49.5	59.5	65.1	63.3	53.9	43.7	32.8	21.3	37.9	62.6	43.5	18.5	40.6
Temiscaming	9.2	18.4	24.4	39.0	49.4	62.7	67.3	65.6	53.4	40.8	26.0	17.7	37.6	65.2	40.1	15.0	38.6
Penetanguishine	21.4	19.7	29.4	36.1	52.0	65.2	70.4	68.5	53.2	45.8	36.7	24.0	39.2	68.0	45.2	21.7	43.5
Fort Wilkins	23.6	22.0	28.9	38.8	52.8	56.8	64.7	65.1	56.8	44.0	30.9	20.7	40.2	62.2	43.9	22.1	42.1
Sandy Lake	13.8	18.2	29.7	38.3	50.1	61.2	67.6	65.5	58.3	43.4	22.8	9.9	39.4	64.8	41.5	14.0	39.9
Fort Ripley	8.6	13.7	25.8	36.2	49.7	61.9	66.9	64.8	57.1	43.1	30.7	6.6	37.2	64.5	43.6	9.7	38.8
Fort Garry	—12.5	....	....	....	....	....	69.0	....	....	....	....	....	....	....	....	....	....
Fort Union, Mo	21.3	17.5	32.5	49.9	49.8	66.0	73.6	70.7	58 4	....	....	....	44.1	70.1	....	....	....
Fort Union, N. M	31.8	35.0	42.2	50.9	57.3	59.5	66.2	63.9	56.8	47.5	35.5	33.4	50.1	63.2	46.6	33.4	48.3
Lapwai	31.8	38.5	42.7	52.8	57.5	68.9	70.1	72.0	64.0	48.1	41.5	40.4	51.0	70.3	51.2	36.9	52.4
Fort Colville*	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fort Vancouver	41.6	41.3	42.4	53.4	61.5	67.4	68.5	67.2	61.6	54.3	44.4	35.7	52.4	67.7	53.4	39.9	53.4

*This is an important limiting station, which would have temperatures very nearly like Lapwai and Fort Vancouver.

POSITION OF THE LOCALITIES AND AUTHORITIES OF THE OBSERVATIONS EMBODIED IN THE SEVERAL TABLES RELATING TO THE LIMITS OF MAIZE CULTIVATION.

In the list of stations on its northern limit in the table of mean temperatures, the following are the positions and sources of observation:

Albion Mines, Nova Scotia, latitude 45° 30′—10 years' observations by Henry Poole, esq.

Frederickton, New Brunswick, latitude 46°—a series from Dove.

Houlton, Maine, latitude 46°, (Hancock Barracks)—17 years' observations at the military post.

Quebec, latitude 46° 48′—Rev. Dr. Sparks, 10 years, through J. H. H. Latour, esq., Montreal.

Fort Coulonge, Ottawa river, Canada, latitude 45° 50′—Siveright, 8 years' observations by J. H. H. Latour, esq.

Malone, Franklin county, New York, latitude 44° 50′—academy observations, 10 years.

Fort Mackinaw, Michigan, latitude 45° 50′—military post observations, 17 years.

Fort Brady, Lake Superior, latitude 46° 30′—21 years' observations at military post.

Temiscaming, Upper Ottawa river, Canada, latitude 47° 19′—2 years' observations by Siveright, from Richardson.

Penetanguishine, Georgian bay, C. W., latitude 44° 48′—1 year's observation by Todd.

Fort Wilkins, south shore of Lake Superior, latitude 46°—2 years' observations at military post.

Sandy Lake, Minnesota, latitude 46° 45′ (on Mississippi river, near head of Lake Superior)—2 years' observations by Rev. Mr. Holt.

Fort Ripley, Minnesota, latitude 46° 10′—2½ years' observations at military post.

Fort Garry, Lake Winnipeg, British America, latitude 50° 19′—2 months' observations by Moody, from Richardson.

Fort Union, on the Missouri, latitude 48°—observations by Prince Maximilian, in 1832-33.

Fort Union, New Mexico, latitude 35° 57′ (near Santa Fé)—observations at military post 1½ years.

Lapwai, Kooskooskia river, Oregon, latitude 46° 27′—2 years' observations at Mission by Rev. Mr. Spalding, from Wilkes.

Fort Colville, Washington Territory, latitude 48° 30′, on Clarke's fork of the Columbia—no observations.

Fort Vancouver, Columbia river, Oregon, latitude 45° 40′—2 years' observations at military post.

The list of extreme temperatures for the plains of the interior, embraces the following:

Pembina, valley of Red river of the North—observations by Charles Cavileer.

Fort Gaines, (Ripley,) of the upper Mississippi, military post.

Fort Leavenworth, on the Missouri river, Nebraska Territory.

Fort Kearney, Platte river, Nebraska.

Fort Laramie, upper Platte river, Nebraska, near Rocky mountains.

Cantonment Loring, (Fort Hall,) Lewis's fork of the Columbia, Oregon route.

Valley of Great Salt Lake, Utah—Captain Stansbury's observations.

The stations of the Pacific and other western climates are irregularly grouped. From the Pacific coast they have the following order:

San Diego, southernmost point of California, on the Pacific.

Fort Yuma, junction of Gila and Colorado rivers, of California, near the head of the Gulf of California.

San Luis Rey, on the Pacific, a little north of San Diego.

Rancho del Chino, near San Luis Rey, a short distance in the interior.

Monterey, on the Pacific, south of San Francisco, and at the most exposed point to the sea influence.

Benicia, north of San Francisco a few miles, and somewhat protected from sea influence.

Fort Miller, valley of the San Joaquin river, southeastward from San Francisco.

Cantonment Far West, Sacramento valley, north of San Francisco.

Fort Reading, near the head of the Sacramento valley, California.

Port Orford, mouth of Shasta river, Southern Oregon.

Astoria, mouth of the Columbia, Oregon.

Steilacoom, or Puget's sound, southern point of Puget's sound, Washington Territory.

Columbia Barracks, or Fort Vancouver, north bank of Columbia river, Oregon, near Oregon city.

Dalles of the Columbia, near the passage of the Cascade mountains, by the Columbia on the east.

Oregon city, near the mouth of the Willamette river, Oregon.

NEW MEXICO.

El Paso, or Fort Fillmore, the first fort near the boundary, a few miles north of the town of El Paso.

Fort Webster, near Copper Mines of New Mexico, on the Rio Mimbres, west of Fort Fillmore.

Fort Conrad, Valverde, valley of Rio Grande, at 34° north latitude. Socorro is very near, and represents the same climate.

Albuquerque, on the Rio Grande, New Mexico, latitude 35° 13′.

Cebolletta, a short distance northwest of Albuquerque.

Santa Fé, New Mexico, latitude 35° 40′, 7,000 feet above sea.

Las Vegas, New Mexico, one degree of longitude eastward of Santa Fé, at 6,500 feet elevation.

CLIMATIC RANGE OF THE SUGAR-CANE.

The cane is more nearly associated with Indian corn in the general character of its climatic requirement than any other staple. It differs in this respect only in degree—each condition, or the principal condition of temperature, at least, being required in similar, but greater, tropical excess for the period of its growth. The cane is, indeed, wholly tropical for every other climate than that of the United States. In the southern part of the United States the great heats of summer give this plant a range it attains in no other country of the same mean annual temperature; and it is limited only by the limit of its safe endurance of the winter. So far as the root-cane may remain uninjured by the frosts of winter, it may be cultivated successfully, as the aqueous precipitation and humidity are quite ample for all parts of the older States south of 34° north latitude, and east of the high plain and the deserts of Texas.

The area now occupied by the cane is quite limited—the lower parishes of Louisiana, a portion of Florida, in the latitude of Tallahassee, to Cedar Keys, and the Atlantic coast of Georgia, comprising its present extent. It is, however, a much larger interest than might be inferred from its limited range, in consequence of the immense capital required to conduct such estates successfully; and the possibility of its extension and enlargement becomes an important point of public interest for many reasons.

In examining this point, some comparison of the temperatures observed in the present cane districts with those in adjacent districts, and the comparison, also, of amount of rain in the same manner, will assist in the determination.

The analogies of the plant itself are also important. Its structure and saccharine development in the stem are strikingly paralleled in the

stem of corn, and the conditions found to bring the last to the highest development may reasonably be supposed to be equally true of the cane. The short hot summer of the Middle States, and even of New York, loads the stem of the corn-plant with saccharine matter, and it is not unreasonable to anticipate similar results from limiting the period of growth in the case of the cane. Such has been the case, indeed, so far as the attempt has been made to extend the sugar culture in the United States; and though no precedent in cane culture can be cited, as no tropical climate elsewhere merges in this manner into temperate latitudes, the success of this extension in our climate cannot be doubted.

The table of temperatures observed in the present cane districts, and to the limit of its probable extension, will show how far mean temperatures for the several months justify such anticipations. With a summer heat high enough, the abrupt curvatures at the extremes of the season of growth are not injurious, if their limit still saves the life of the cane for the winter. Without knowledge of the point at which this is limited absolutely, it may probably be safely stated as nothing less than the freezing of the earth so much as to destroy the root of the cane. Frosts not affecting the earth so much that slight protection may not guard the cane-root from injury, cannot be destructive to this cultivation, if it follow the law of acclimatization of similar plants, as Indian corn, since this is ripened more promptly, and placed beyond injury by the approach of great changes in the autumn temperatures. As the heats of the summer close, the cane should be perfected in the same manner, and experiments upon this adaptation have, so far, been highly successful in the United States.*

In reference to the actual periods of growth for the cane in different climates, we have unfortunately but few facts. Such as have been noted are indications that, as the temperatures are lower, the period is increased, though no full comparison seems yet to have been made. Boussingault gives some notices of South American climates, as that at Venezuela, where the mean temperature of the year is 82°, the cane ripens in eleven months; where the annual mean is 76°, twelve months are required; where 74°, fourteen months; and where 67°, sixteen months. The notices are from Codazzi's Geography of Venezuela.

But of these climates it may be said that the lowest temperatures are in rainy districts, in which the annual curve during the months is very slight. These differences are scarcely such as to give ripening temperatures in any part of the year, and the cases prove rather the continuance of vegetation over those periods undisturbed, than any periodicity in the growth of cane due to a low mean annual temperature.

As far as examination has yet gone, we find no periodicity in the growth of any class of plants, and especially in those of semi-tropical origin, which may be discussed by the aid of mean annual temperatures alone. All depend upon the summer curve of differences among the months; and, as a rule, these periods are short or long, as this curve is high or low.

---

*See an able article in De Bow's Review for March, 1853, and other articles there referred to.

The following tables are appropriately next in the discussion of this range of the sugar cane. They embrace results for a period sufficiently extensive at each locality to give them the most decisive value for whatever they may in this way express. It was thought better, also, to include some portion of the cotton-growing districts, and to make the tables serve for the examination of both staples.

Mean results in temperature and aqueous precipitation are the most important, and these usually give the boundaries of even annual cultivation more precisely than other forms of statistics, though in the United States the exceptions and limitations fall within the limits mean temperatures indicate. The limit of entirely successful cultivation is often a very different thing from this possible range, however, and it may fall far short of the other. The possible range of single extremes is here very great, and the cane, though least liable, perhaps, to this description of injury, does not wholly escape. Cotton is largely affected by such changes, and it has a wide margin of but partially assured success, which will be noticed more particularly in speaking of cotton alone.

The tables are deduced from observations representing very nearly the true mean temperature, as derivable from observations for each hour of the twenty-four. The hours observed in most cases represent this mean very nearly, and when this is not the case the principal corrections have been applied.

The amount of water falling, in rain and snow, is given in inches and tenths of vertical depth for an entire month, and for the mean of months and years.

Mean temperatures of the cane and cotton districts of the United States, with some foreign tropical comparisons.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Key West	70.0	70.7	73.8	76.3	80.2	82.1	82.3	83.5	82.5	79.1	75.6	72.8	76.7	83.0	79.1	71.2	77.5
Cedar Keys	53.9	59.7	67.3	68.7	75.8	78.6	80.5	80.7	78.7	73.1	64.4	59.8	70.6	80.0	72.1	57.8	70.1
St. Augustine	55.9	58.7	62.4	68.0	71.8	78.2	80.0	80.1	78.1	70.9	63.9	56.0	67.4	79.4	71.0	56.8	68.7
Savannah	52.6	54.7	60.0	68.4	74.8	79.4	81.3	80.5	76.9	67.2	58.3	52.2	67.7	80.4	67.5	53.0	67.2
Mobile	56.4	57.4	65.6	70.0	76.3	82.2	82.4	82.7	78.9	70.0	61.5	55.5	70.7	82.4	70.1	56.4	69.9
Pensacola	56.2	57.8	64.5	68.6	76.5	80.7	84.9	83.6	78.9	71.0	61.3	57.8	69.9	83.0	70.4	57.3	70.1
New Orleans	54.8	54.4	61.5	67.6	74.0	78.6	80.4	79.6	77.1	69.1	87.5	56.2	67.7	79.5	67.9	55.2	67.5
Galveston	48.1	58.0	63.5	70.0	78.7	80.7	83.0	83.3	78.3	73.1	60.2	55.6	71.0	82.5	70.2	53.8	69.4
Brownsville	59.5	66.9	69.4	74.5	78.9	80.8	83.3	84.6	80.4	73.9	66.9	60.8	74.3	82.9	73.7	62.4	73.3
San Antonio	52.7	57.8	65.5	69.7	76.4	80.5	82.3	83.8	79.9	72.2	62.2	52.1	70.5	82.2	71.4	54.2	69.6
Fort Jesup	50.5	52.3	59.3	67.4	73.7	80.3	82.3	81.3	76.1	66.2	56.7	50.3	66.8	81.3	66.3	51.0	66.4
Natchez	51.2	52.9	60.5	70.2	74.5	80.8	82.2	80.9	76.9	65.9	57.1	50.2	68.5	81.3	66.6	51.4	66.9
Fort Washita	44.7	47.9	52.9	63.5	70 7	76.5	81.3	81.0	75.1	63.2	51.6	42.8	62.4	79.6	63.3	45.1	62.6
Vicksburg	47.8	52.7	63 3	63.7	73.0	77.7	78.7	78.7	74.1	65.4	74.5	50.4	66.7	78.4	64.7	50.3	65.9
Memphis	41.7	45.9	55.3	59.0	68.9	75.8	79.9	78.5	72.5	58.4	53.3	40.2	61.1	78.1	61.4	42.6	60.8
Erie	45.4	51.4	58.9	62.9	73.9	78.2	80.5	80.5	75.3	64.8	53.2	47.2	65.2	79.7	64.4	51.3	65.2
Perry	39.8	55.1	63.2	62.9	74.1	78.2	82.3	78.8	74.8	67.6	53.3	50.9	66.7	79.8	65.3	48.6	65.1
St. John's, Berkeley	49.1	53.6	57.5	62.4	70.2	74.8	78.8	77.9	73.1	64.1	55.2	52.1	63.4	77.2	64.1	51.6	64.0
Tropical districts.																	
Havana	70.0	71.9	75.7	79.0	82.5	83.1	83.3	83.8	82.0	79.5	75.5	71.7	79.1	83.4	79.0	71.2	78.2
Kingston	75.7	76.0	76.0	78.1	80.2	80.6	81.6	81.0	80.7	79.8	78.7	76.4	78.1	81.1	79.7	76.1	78.7
Barbadoes	78.0	78.0	79.1	78.2	79.6	78.1	79.0	78.5	82.1	82 2	81.8	79.3	79.2	78.5	82.1	78.5	79.5
Madeira	60.2	61.1	63.4	65.4	67.9	69.4	71.7	72.8	72.1	69 5	65.4	64.2	65.6	71.3	69.0	65.8	67.9
Catania	49.3	54.3	56.0	61.0	71.6	78.9	86.5	88.2	78.6	69.9	59.7	54.9	52.8	62.8	84.6	69.4	67.5
Alexandria	57.3	57.8	62.1	66.9	70.2	76.2	78.5	80.3	78.1	74.8	68.4	60.4	66.4	78.3	73.8	58.5	69.3
Calcutta	69.4	74.2	82.3	87.1	87.2	85.1	84.2	83.6	84.0	82.0	75.7	69.2	85.5	84.3	80.6	70.9	80.3

TEMPERATURE STATIONS.

Key West, Florida, nine years' observations by W. A. Whitehead, esq.

Cedar Keys, Florida, three years' observations by Judge A. Steele.

St. Augustine, Florida, twelve years' observations at Fort Marion by the assistant surgeon of the post.

Savannah, Georgia, eleven years' observations by Dr. John F. Posey.

Mobile, Alabama, three years' observations by Dr. North.

Pensacola, Florida, four years' observations by J. Pearson, master of navy yard.

New Orleans, eighteen years' observations by Dr. E. H. Barton.

Galveston, Texas, one and a half year's observations at coast survey tidal station.

Brownsville, Texas, three years' observations at Fort Brown, by assistant surgeon of post.

San Antonio, Texas, three and a half years' observations at military post.

Fort Jesup, Louisiana, twenty-three years' observations at military post.

Natchez, Mississippi, seven years' observations by Dr. Tooley.

Fort Washita, Indian Territory, ten years' observations at military post.

Vicksburg, Mississippi, four years' observations by E. Leland Hatch, esq.

Memphis, Tennessee, three years' observations at navy yard.

Erie, Alabama, three years' observations by Drs. Jennings and Osborne.

Perry, Georgia, two years' observations by Dr. George F. Cooper.

St. John's, Berkeley district, South Carolina, nine years' observations by H. W. Ravenel, esq., secretary of Black Oak Agricultural Society.

TROPICAL DISTRICTS.

Havana, Cuba, three years' observations from Spanish West Indies, by Robredo.

Kingston, Jamaica, five years' observations by Lindsay.

Barbadoes, West Indies, one year's observations by R. Young, from Dové.

Catania, Sicily, three years' observations from Dové.

Madeira, (Funchal,) two years' observations, Mason's Treatise on the Climatology of Madeira.

Alexandria, Egypt, three years' observations by H. Thurburn, Journal Royal Geological Society.

Calcutta, India, ten years' observations from Dové.

Mean monthly and annual fall of rain in the sugar and cotton districts of the United States, (inches and tenths vertical depth.)

Places.	No. of years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Savannah	14	2.6	2.6	4.2	1.9	5.7	4.7	9.4	9.3	4.9	3.1	1.7	3.2	11.8	23.5	9.7	8.4	53.4
St. Augustine	3	2.1	1.6	2.8	1.1	2.5	3.0	3.6	5.7	2.5	3.0	0.5	2.1	6.4	12.3	6.0	5.8	30.5
Cedar Keys	2½	2.6	1.3	2.7	1.2	1.1	5.8	10.6	5.5	11.7	3.6	2.9	2.4	5.0	21.9	18.2	6.3	51.4
Fort Brooke	13	1.8	2.8	3.5	1.7	3.2	6.7	11.2	10.4	7.2	2.5	2.0	2.3	8.4	28.4	11.7	6.9	55.5
Mobile	10	5.7	5.4	3.9	4.4	4.3	6.2	6.3	6.8	2.8	3.1	6.3	5.8	12.6	19.4	12.2	16.9	61.0
New Orleans	13	6.5	4.4	2.7	4.1	3.4	5.4	6.5	5.5	4.0	2.6	3.5	4.7	10.2	17.4	10.1	15.6	53.4
Fort Brown	3	1.9	1.9	1.0	0.6	2.4	2.7	1.8	1.9	4.8	4.9	2.5	4.1	4.0	6.4	12.2	7.9	30.5
San Antonio	3	0.8	4.6	2.9	2.8	3.2	6.3	2.6	0.5	1.9	1.8	2.3	2.9	8.9	9.4	6.0	8.3	32.7
Fort Croghan	3½	1.3	4.0	5.3	4.4	2.8	3.5	2.8	1.3	2.2	2.1	3.9	3.1	12.5	7.7	8.2	8.4	36.7
Fort Towson	14	3.4	3.1	4.4	5.6	5.5	6.2	5.4	4.0	3.2	4.6	4.6	2.8	15.5	15.6	12.4	9.3	53.0
Fort Jesup	9	4.4	2.7	4.6	4.7	3.8	4.6	3.8	2.8	2.9	5.1	3.1	4.1	13.1	11.1	11.1	11.2	46.5
Natchez	8	6.3	4.3	4.7	4.6	5.5	4.9	5.4	3.3	5.2	3.6	4.5	5.8	14.8	13.6	13.3	16.4	58.2
Jackson	3½	5.5	6.1	2.4	5.3	3.2	4.6	6.2	3.4	0.9	2.4	6.2	6.8	10.9	14.2	9.5	18.4	53.0
Vicksburg	3	9.9	4.2	3.9	3.1	3.0	3.7	2.2	4.8	3.8	3.5	3.9	2.2	10.0	9.5	11.2	16.3	48.4
Memphis	3	3.3	6.6	4.2	3.4	3.4	3.1	1.8	2.9	1.5	2.9	3.5	5.1	11.0	7.8	7.9	15.0	41.8
Monroeville	4	3.6	7.7	4.8	6.5	7.9	5.2	7.7	8.6	1.5	1.6	5.6	4.9	19.2	21.4	8.7	16.2	65.6
Perry	2½	1.4	2.9	2.5	3.5	4.3	3.3	5.1	8.2	1.3	1.5	9.2	3.5	10.3	16.5	12.0	7.8	46.7
Charleston	10	2.3	2.2	4.5	1.8	4.3	4.3	6.4	7.3	5.7	2.5	1.5	3.1	10.6	18.0	9.7	7.6	45.9

The degree of humidity and amount of rain may be supposed to be important and perhaps controlling conditions of climate affecting this cultivation. How far they are so, has been but slightly examined by the aid of precise statistics. Though usually flourishing in districts of great humidity, and of a large amount of rain, there is much reason to suppose that those conditions are quite unimportant in their climatic relations merely, and that the high fertility usually attendant upon such climates, or resulting from them in the accumulation of vegetable matter and alluvial soils, is the only thing necessary to the growth of cane. The distinction may be unimportant in the range of the cane in our climates, as, for all districts of the necessary fertility, the aqueous precipitation, at least, is quite large. The narrower range of fertile tracts in the southern interior and Pacific climates would scarcely permit its cultivation, whatever adaptation of climate might be found.

In this reference to the fall of rain and snow, and humidity, cotton is more directly affected than the cane, and the results of observations to the extent of the cotton region, and including that of the cane, are given in a table in connexion with the examination of the range of cotton cultivation.

That humidity, as a condition apart from aqueous precipitation, is not injurious to the cane in tropical climates, or with tropical temperatures in any climate, is quite apparent from what is well known of its most successful districts. The *tierras calientes* of Mexico, with their saturated atmosphere and profuse rains, for one part of the year, seem equally suited to its growth there, and in the dry season alternating in the same district; and equally with the constantly dry districts of the Eastern continent, where it is cultivated. At some periods of the summer, though variably in various years, the local humidity of Southern Louisiana becomes excessive; yet it is not noted as injurious, except in such excessive rains as mechanically break and injure the growths.

It may be reasonably inferred that no portion of the Southern States in which cane is now grown would be influenced by other conditions than temperature as merely climatic. Fertility, or specific character of soil, as alluvial, or largely abounding in vegetable matter, is doubtless indispensable.

The present limits of actual cultivation of the cane in Georgia reach to 32½° of latitude. The lower portion of the State, to this line, yields a greater or less product of ripened cane, and the chief obstacle to its cultivation, as a staple for export, appears to be the limited area of lands of the proper fertility. But a small share of the lands below 32½° will bear high cultivation in this State, and the actual cultivation of this staple there attained is only of local importance, except as showing the conditions of climate to be no obstacle.

In Florida, the same remark holds of almost the entire State. Some portions between Cedar Keys and St. John's river, and upon the rivers in that portion of the State, have a higher fertility, and may be made to produce abundantly when estates are generally opened. The climate here rapidly approaches the tropical character, and ceases south of the latitude of Cedar Keys to possess the distinguishing features of the principal portion of the cane district in the United States generally.

In Western Florida, the limit of the present cultivation of cane falls lower than in Georgia, and only portions of the counties bordering the Gulf are considered favorable to it. It may still be doubted whether this limit is one of climate only, and whether, with a favorable soil, both Western Florida and Alabama might not attain to latitude 32½° in an entirely successful introduction of this cultivation.

In Mississippi, little staple cultivation of the cane exists. The southeastern counties have thin soils, and the greater area of the State east of the immediate vicinity of the Mississippi seems little adapted in soil to the cane. The western part of the State, however, carries the cultivation further north than in any State eastward; and the extreme limit of Holly Springs, near the 35th parallel, has produced successful growths of ripened cane.*

Louisiana is adapted to cane in every part, so far as climate is concerned. The south and centre are pre-eminently favored in soil; yet the excessive rains and the violence of storms occurring before the temperature has fully ripened the cane, in some measure balance the disadvantages of climate, which diminish the product in the colder parts of the State.

In Texas, the northern limit falls off even on the eastern border, and quite rapidly in going westward, in consequence of the general effect of the plains in producing great extremes of temperature. The northers and sudden changes diminish the thermal effect at the lower levels, and on the elevated plains they are still more severe. A line nearly diagonal to the parallels of latitude and longitude from the eastern boundary at 32½°, to San Antonio and Eagle Pass of the Rio Grande, would very nearly limit the country capable of producing the cane. For some portion of this district the extreme temperatures would render the risks

* Article on "Extension of Sugar Region," in De Bow's Review for March, 1853.

too great for reliance as a staple; but for most of it the question of success would depend upon soil and circumstances other than climate.

By the annexed tables of extremes of temperature in this region, it will be seen that San Antonio, in latitude 29° 20′, has as great a range and as severe extremes as Vicksburg, in latitude 32° 25′. The cause of this great difference is evidently in the great arid plains and mountains of Northwestern Texas, and their proximity to the heated and humid basin of the Gulf. The most extreme alternations of temperature and humidity occur in consequence of this relative position, which, at the occurrence of storms, calls unusual forces in operation from these extreme contrasts.

Minimum temperatures at stations in Texas.

Years and stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Fort Brown.												
1850	38	38	42	52	56	70	73	75	71	54	46	22
1851	36	42	42	54	64	72	72	73	62	52	31	28
1852	22	44	45	45	68	67	73	74	64	50	46	43
Ringgold Barracks.												
1850	40	32	35	58	54	69	76	74	68	42	42	18
1851	26	44	37	58	59	73	75	73	69	52	28	27
Fort McIntosh.												
1850	36	30	34	42	48	67	74	74	62	42	38	17
1851	29	37	33	54	56	70	72	70	62	47	23	23
1852	19	40	36	47	68	62	70	72	57	43	30	34
Fort Duncan.												
1850	37	29.5	35	38	43	66	70	67	61	43	34.5	12
1851	27	30	24	58	63	76	77	77	74	61	32	20
San Antonio.												
1850	36	25	35	49	50	70	73	71	65	50	39	18
1851	27	32	29	50	50	70	70	72	64	53	30	30
Fort Croghan.												
1850	28	15	28	32	40	50	62	67	60	41	30	9
1851	23	25	25	44	48	66	72	72	50	46	28	18
1852	8	30	34	40	56	60	69	68	51	40	32	24
Fort Gates.												
1850	34	20	29	37	40	55	61	62	54	30	26	4
1851	19	20	14	47	46	71	74	72	54	42	22	15
1852	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Martin Scott.												
1850	28	21	27	36	42	58	64	64	56	38	26	10
1851	22	25	19	48	54	63	66	72	47	40	23	22
1852	7	32	31	38	.....	.....	.....	.....	.....	.....	.....	.....
Fort Lincoln.												
1850	40	30	30	40	45	60	67	65	58	.....	.....	.....
1851	.....	.....	.....	.....	.....	.....	71	70	59	44	24	28
1852	12	36	35	42	63	68	74	.....	.....	.....	.....	.....
Camp Arbuckle.												
1851	11	19	21	32	.....	.....	61	56	38	34	24	7

Generally the range of the cane in the United States is large, and quite sufficient for any national requirement of this description of products. It is not proposed to consider this extension of its growth in any other view than that of climatic adaptation. As an economical inquiry, the character of soil and modes of cultivation enter largely, and these may continue to modify actual results much in the same measure they have hitherto been modified. Enough appears in the present line of inquiry, however, to encourage vigorous efforts to introduce the sugar culture into all the districts here enumerated. The probabilities are largely in favor of success; and when it is remembered that its acclimatization in semi-tropical districts has only been attempted in this case, and has so far been fully successful, it is certainly worth further effort to continue its extension.

COTTON IN THE CLIMATE OF THE UNITED STATES.

The list of plants originally or elsewhere tropical, and which become thoroughly acclimatised as staples in the United States, embraces several of great value. Cotton ranks first for its actual range, and for the district it occupies; and perhaps first for the country, as a whole. Some species of this genus of plants is found in every tropical climate either as native or introduced, and some instances of the cultivation of the annual plant in temperate latitudes elsewhere occur; but it nowhere else attains the financial and industrial importance it has in the United States. Passing its native limits altogether, and in a climate which at the outset would have been thought quite uncongenial, it rises to the highest rank as an agricultural staple, and develops the most extraordinary adaptation to our peculiar climate.

The cotton and cane regions in the United States are nearly identical as far as the cane goes, though there is a partial exception where we come nearest to tropical features in excessive summer rains and greater humidity, which will be noticed in connexion with the statistics of rains apparently best adapted to cotton. In temperature conditions the two staples agree very well, and in fact they range through the higher temperatures without any known limit in that direction in both cases. No summer seems too warm for either, apart from any connexion with humidity.

Defining our own cotton districts particularly, we find the mean summer temperature sufficient over a very large district, and that the characteristics of our climate in respect to frosts and single extremes of temperature must be taken as the principal guide. The summer months continue at a mean temperature quite well adapted to this growth as far northward as the lower portion of the Ohio river, in the 39th parallel of latitude, and nearly as far north on the Atlantic coast. The 36th parallel is, however, the limit of staple cultivation, and from this to the 35th only the more favorable aspects and districts are safe against extremes of cold.

In Northern Georgia and Alabama a small mountainous district prevents the cultivation of cotton, and nearly half of Tennessee, with a smaller share of North Carolina, is unfavorable for the same reason. Arkansas has some exceptions in the mountainous districts of the north-

western part of the State, and the most decided elevations in Central and Western Texas restrict it in that direction. For all the enclosed district the climate is singularly favorable to the staple cultivation of the annual cotton plant, and the practical questions are only those of special adaptation to the soil of different localities.

The whole of this great district is not, of course, at present occupied by this crop as far as it might advantageously be, under all the conditions which control the result. In many counties of Alabama, Georgia, and Texas particularly, the extension of its cultivation would furnish a better quality of the fibre, and thus equal in value the produce of warmer and richer lands from the increased price the better quality would bear. Such is the apparent influence of climate solely, and the shorter season has no other effect than to limit the period of growth in slight degree, with a diminished amount and an improved quality of the fibre. So far as the cultivation has recently been extended in new and more northern localities of the States of the Gulf and south Atlantic coast, this has been a uniform result.

In the States of the Mississippi valley, or those adjacent to the river, rather, the limit of this crop is considerably extended. The whole of Western Tennessee and Eastern Arkansas may produce cotton successfully as a staple, and instances of successful growth have occurred above the 39th parallel of latitude, in the river valleys of Missouri.

A summer mean temperature of 77°, and a mean for the year of 60°, appear, from the best comparisons of American records of temperature with actual cultivation, to be the lowest temperatures in which it may be entirely successful here. There appear to be no districts too warm, as said before, though in portions of the southwest of Texas the summer mean rises to 85°. With these definitions in mean temperature, there are important limitations in respect to extremes. The summer must be exempt from frost from the middle of April to the middle of October, and the great range of temperature occurring at these extreme months in many parts of the United States, especially in the interior, and in all districts not partaking of sea influences, restricts this cultivation much within the limits permitted by mean temperatures. It might be carried into the valleys of the Ohio and of the Mississippi, above the mouth of the Ohio, but for the spring and autumn extremes.

Amount of rain and the degree of humidity become important in the cultivation of cotton. Unlike the cane and corn, it cannot endure the excessive rains and the saturated atmosphere of a tropical rainy season; and wherever these conditions occur in the period of full growth, and during the processes of maturing, they greatly injure it. In Southern Louisiana, extreme seasons may induce quite decisively tropical features of the summer climate, and the possible injury in these cases enters largely into the estimate of the general risks attending the crop.

We are not sufficiently familiar with the requirement and range of the various species of this genus, to say that the result in case of the annual plant we cultivate is or is not singular, or whether any other species would permit of field culture, and yet be more hardy in this respect. Of the results in this case, however, we may not be in doubt, and may rely upon the fact that the annual field cotton has become, if it were not always and originally such, an extra-tropical plant, which

attains its highest perfection in a temperate climate of high summer temperatures. It certainly does not bear introduction into climates where alternate wet and dry seasons occur, and most parts of India present, for this reason, insuperable obstacles to the introduction of the American annual plant. The tree-cotton, or the woody and purely tropical plant, appears to have greater power of endurance of these humid extremes; but it does not seem to possess the same facile adaptation to the extensive cultivation required in field treatment and the management of estates, and it can never compete with the first in the markets of the world in cheap production.

The climate of a very large portion of the United States, embracing all south of the 35th parallel in the Atlantic States, of the 37th in those bordering the Mississippi, and to a line drawn from Central Arkansas diagonally through Texas to the Rio Grande, is singularly well adapted to the most extensive field cultivation of this indispensable staple. There is no area of similar extent which combines all the requisite conditions of climate; and the magnitude of the interests depending, and to depend for an indefinite period upon it, should induce great care that this cultivation is not permitted to exhaust its capacities in any manner. Those of climate are constant, and cannot, so far as we are enabled to compare climates of either hemisphere, be reproduced, and may not be found repeated.

The special comparisons of temperature which illustrate this position may be found in the table given in connexion with the sugar-cane, and in the tropical selections from climates of the Eastern continent. The summer temperatures are all equal to those of tropical districts, and are, probably, so far, of less importance than the amount of rain. To compare in this respect, we have but to refer to the amount given for localities in the cotton region of the United States, and to the known rule of distribution in tropical countries generally. In these the rainy season is almost always in summer; and where this season attains its maximum of humidity, as in the *tierras calientes* of Mexico, the annual plant is not cultivated. In northern Mexico, where the elevation is such as to render the rainy season little more than the actual summer rains of the United States, a growth of cotton exists similar to ours, though the area permitting this is extremely limited.

The table connected with the climatic range of the sugar-cane exhibits some of the more striking contrasts in distribution of rain affecting this staple.

The positions briefly indicated in the foregoing remarks may be further illustrated by a sketch of the varied range of the several species of cotton at different periods, and from the earlier dates of its cultivation. It is difficult to do more than give a general sketch, however, as the precise facts are not easily attained. Its relations to climatology are all we can determine, or would undertake here, and something may, perhaps, be done in this direction.

Some degree of cultivation and use of cotton has existed from time immemorial; yet the general character of this use in the arts was much more peculiarly local than that of any other material for fabrics or any other class of manufactures. It entered very little, if at all, into commerce; and there are scarcely any historical evidences of commercial use of cotton

until the activity of England began to gather raw material for fabrics of every sort in the seventeenth century. Some local or limited commerce in raw cotton undoubtedly existed, for some centuries previous, between small States in the south of Europe and Asia; but it had no general importance.* Fabrics, generally, of silk and wool, and the raw material for these, were the subject of extensive commerce many centuries earlier; and the point to which some attention seems to be deserved is, that with all this activity in the commerce of fabrics and raw material, scarcely anything was done in cotton until a more favorable climate permitted the great expansion which has taken place in this production in the United States.

Under the stimulus of the new demand arising in English manufactures, there seems also to have been no increase of production in the original cotton-growing regions. The best tables of the amount produced at different dates, whether entering directly into commerce or reported as the entire amount produced, give decreasing rather than increasing amounts for all these older countries. The restriction cannot, therefore, have been in the inactivity of commerce nor of manufactures, and it is very clear that it should be referred to those of cultivation merely—to the inadequate climate and soil for the production of raw cotton beyond the local demand.

That this limitation was mainly in climate, is still more evident by reference to the particular districts. In India, the localities of its greatest success are so purely tropical as to be adapted to the perennial species almost exclusively. The specific characters are but imperfectly determined, but it appears that the herbaceous species of temperate climates are nearly identical in these characters with the woody or tree cottons of India, and are, probably, offshoots of these perennial originals. This point is unimportant in the present case; but the reverse change, if change has taken place from the Indian species at all, of introducing herbaceous and annual varieties into India from the United States or other countries, is one of the greatest questions connected with cotton cultivation in its present immense expansion. The transitions from our climate to that of Lower India are so abrupt, that the herbaceous forms can scarcely be retained; and when the limits of this more purely tropical region are passed, the mountainous character of that continent soon shuts off the cultivation altogether. The upland districts of India, in which the plant will retain its herbaceous character, are too limited to supply any important measure of the demand now created in the commerce of the world.

Of Persia, Egypt, and Italy, the same remark may be made. Mexico has also but a limited area adapted to field culture of herbaceous cotton; and though all these districts may produce it for local supply, they are in no condition to furnish those surplus amounts of the raw material so imperatively necessary in the commercial States. With the demand rapidly and constantly extended as it has been for the last half century, the capacity of these older districts of its cultivation would have ex-

* In addition to what is said on pages 178 and 179 of this report relative to the early history of cotton, it may be stated that it extensively entered into the trade of China about the middle of the seventeenth century, and its manufacture had long before been regarded of great importance throughout Egypt and Syria, and most other countries of the East. D. J. B.

hibited some expansion if such had been possible; but we note a steady, and sometimes large, decrease in the produce of Mexico, Africa generally, and all parts of Asia, except India, for the last three-fourths of a century.

The capacities of India have been more fully tried than any part of the United States, within this period, in persistent and well directed efforts to extend this cultivation. The wants of the English government, and the interests of their rule in India, have pressed them to make every exertion in aid of existing cultivation, and in the initiation of new modes. It has been attempted to make the American adaptation available there, and the well-established success of certain species of the plant, and certain modes of cultivation here, have been, as far as could be done, transplanted together to India, in the hope of attaining similar success there. But the American adaptation was itself a spontaneous result, rather than a conflict with climatological difficulties, and it appears wholly impossible to transplant its peculiar success. For the most of India the biennial or perennial species are best adapted, and its tropical climate either destroys the produce of the annual plant or changes it to the perennial form. Most of the American plants fail there to produce good cotton at all, and the recent faithful and expensive efforts to introduce it, point only to this result, and must be regarded as failures.

Whether the species peculiar or well adapted to tropical climates may be modified so far as to compete with the cotton of temperate latitudes, remains undetermined, except as the present want of any such success and adaptation may have determined it. There is no positive evidence that the purely tropical cotton may ever supply the want of civilized nations; nor does the Old World appear to offer fields for the cultivation of any species in any considerable degree of expansion beyond their present amount, and that which they have produced for an indefinite period.

From this comparison of the more general results, there are stronger motives suggested for such an analysis of our peculiar adaptation as shall show what the best results are that may be reached here. Very little effort at extension has been made here in fact, and the great advantages we clearly possess may be improved, perhaps, in a large measure. As said before, also, the climatic advantage is a positive and permanent one, and cannot, at any time, fail to the limit we have proved it.

The importance of the peculiar climatology of the cotton-plant as grown in America deserves some extension of the statistical matter given in connexion with the remarks upon the growth of the cane. There are also some misapprehensions, it would appear, respecting the atmospheric humidity of the cotton districts of the seacoast, and the real causes of the excellence of the Sea Island cotton. This is attributed, in some instances, to the greater humidity of this sea climate, and to measures of this humidity which certainly prove destuctive in other localities. There is not, in reality, so large a share of relative humidity, nor so great a positive amount of moisture contained in the air, on the immediate coast and islands of the Southern Atlantic States, as is often found in the interior, and as quite uniformly prevails at New Orleans in the summer months. The distribution of the amount

is more equal at all times on the coast, however, and the atmosphere is neither so dry nor so highly saturated as in the interior. The consequence of this equable distribution is found in the fine staple of the cotton there grown, and it is believed to be a difference belonging exclusively to climatology, which separates this variety from those cultivated in the interior.

The coasts of India are also the best localities for the produce of a good cotton staple; and wherever the coast position is such as to give a low amount of aqueous precipitation, comparatively, and an equable distribution of atmospheric humidity, these results may be expected. But coast climates of little higher temperature may differ widely in this respect, as in the eastern coast of Mexico, and of most parts of South America. These are excessively humid, and their extreme atmospheric saturation quite precludes the cultivation of these varieties of cotton, or of any, indeed, except the coarser perennial species.

To complete the illustration of these points somewhat more fully than the tables given in connexion with the cultivation of the cane will permit, a few stations are here added, giving particular contrasts, and representing extreme American districts. In the first of these the Sea Island district has a very good representation in the observations of R. T. Gibson, esq., at Whitemarsh island, Georgia. The contrast of this station even with Savannah, in temperature and amount of rain, is very striking, and still more decisive with Cedar Keys and New Orleans.

Mean annual amount of rain for the months and the year, (in inches and hundredths.)

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
White-marsh island, Ga., (4½ years)	2.34	1.73	3.31	1.96	4.68	3.56	4.73	5.14	4.86	1.55	2.32	2.85	9.95	13.42	8.74	6.91	39.03
Savannah, Ga., (14 years)	3.19	2.28	3.84	2.75	5.04	4.07	7.25	7.76	4.94	1.55	2.37	5.12	11.63	19.08	8.86	10.60	50.17
Cedar Keys, (2 years)	2.56	1.34	2.65	1.19	1.08	5.79	10.56	5.52	11.75	3.64	2.85	2.44	4.92	21.88	18.24	6.34	51.38
N. Orleans, (13 years)	6.49	4.42	2.73	4.13	3.45	5.40	6.54	5.46	3.95	2.60	3.54	4.65	10.31	17.40	10.10	15.56	53.37
Vera Cruz	5.10	0.00	0.00	0.50	31.40	21.20	59.70	35.90	38.90	8.00	4.50	0.40	31.90	116.80	51.40	5.50	*164.88

* The sums for each month at Vera Cruz are for one year only, (1830;) the mean for the year is for nine years.—*Mayer's History of Mexico.*

These observations are by R. T. Gibson, esq., at Whitemarsh island; Dr. John F. Posey, at Savannah; Judge A. Steele, at Cedar Keys, Florida; and Dr. E. H. Barton, at New Orleans; by each reported in manuscript to the Smithsonian Institution.

The first quantities are clearly less than those at Savannah at all seasons, and the comparison of this island, which is but a short distance from Savannah, and not far from the main coast, shows the Sea Island climate to have a much less excessive amount of rain, and consequently a much less atmospheric saturation, especially in summer. Its temperatures are also lower.

Mean temperatures of specially important districts in the cultivation of cotton.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Whitemarsh island, Ga.	48.3	53.1	58.5	63.1	71.9	76.3	79.1	79.1	73.9	66.0	56.7	52.1	64.5	78.2	65.5	51.2	64.8
Savannah	52.6	54.7	60.0	68.4	74.8	79.4	81.3	80.6	76.9	67.2	58.3	52.2	67.7	80.4	67.5	53.0	67.2
Cedar Keys	53.9	59.7	67.3	68.7	75.8	78.6	80.5	80.7	78.7	73.1	64.4	59.8	70.6	80.0	72.1	57.8	70.1
Havana	65.3	70.0	72.0	75.4	79.7	83.7	85.2	83.6	80.6	78.4	72.6	70.0	75.7	84.2	77.2	68.4	76.4
New Orleans	54.8	54.4	61.5	67.6	74.0	78.6	80.4	79.6	77.1	69.1	57.5	56.2	67.7	79.5	67.9	55.2	67.6
San Antonio	52.7	57.8	65.5	69.7	76.4	80.5	82.2	82.2	79.9	72.2	62.2	52.1	70.5	82.2	71.4	54.2	69.6
Fort Smith	41.6	44.8	50.2	63	69 1	75.7	79.6	78.1	72.1	60.3	49.7	40.0	60.8	77.8	60.7	42.1	60.2
Jefferson Barracks	33.6	35.2	45.5	58.1	67.1	74.4	78.2	76.7	68.4	56.0	45.8	35.5	56.9	76.4	56.7	34.8	56.2
Lebanon	33.7	38.5	47.3	53.9	66.4	73.2	76.4	74.1	68.0	57.0	46.9	35.2	55.9	74.6	57.3	35.9	55.9
Huntsville	42.0	42.6	51.3	61.3	67.2	74.2	76.4	76.2	70.1	59.5	49.7	41.8	60.0	75.6	59.8	42.1	59.7
Knoxville	30.5	42.8	52.4	50.4	64.7	68.5	79.1	69.9	66.0	59.6	44.1	44.5	55.8	72.5	56.4	39.3	56.1
Chapel Hill	42.6	44.0	51.2	59.5	67.2	74.6	77.7	75.4	69.7	59.2	51.6	42.8	59.3	75.9	60.2	42.9	59.6
Fort Monroe	40.5	40.9	47.5	56.1	65.9	74.1	78.3	77.1	71.4	61.7	51.2	43.2	56.5	76.5	61.4	41.5	59.0
Camden	44.7	49.9	55.6	60.6	71.0	76.2	79.7	77.8	73.3	62.2	52.3	47.7	62.4	77.9	62.6	47.4	62.6

The first part of this list represents the warmest cotton climates of the United States. The best single station, Whitemarsh island, Georgia, (near the mouth of Savannah river,) which is a representative of the Sea-Island climates, is seen to be much cooler than Savannah, or any other in this part of the list. Humidity enters largely into the account also, and by reference to the amount of rain at the four stations of Savannah, Cedar Keys, Havana, and New Orleans, it is shown that they are so much more humid as to render the temperature measures too low for just comparison with other localities. San Antonio is drier, and its temperatures better compare with the second list.

In the second part of the list, limiting stations on the north are given. Jefferson Barracks, Missouri; Lebanon and Knoxville, Tennessee; and Chapel Hill, North Carolina, with Fort Monroe, at the mouth of the Chesapeake, Virginia, are all beyond the present actual field cultivation, and each is probably too cold for complete success. Fort Smith, Arkansas; Huntsville, Alabama; and Camden, South Carolina, represent the best northern cotton districts near the limit of its extension.

Lowest observed temperatures in the cane and cotton districts of the United States for each month.

Years and stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
New Orleans.												
1849	.....	.....	.....	.....	.....	.....	.....	.....	64	52	46	33
1850	39	31	38	50	55	56	75	74	69	46	45	30
1851	32	35	38	50	55	69	73	71	55	49	35	23
1852	16	30	39	47	62	65	72	71	64	53	41	37
1853	32	36	43	50	60	70	72	72	60	48	45	38
Austin, Texas.												
1851	.....	.....	.....	42	50	64	68	69	54	47	33	17
1852	13	39	32	40	61	58	71	67	52	42	32	31
1853	24	22	35	46	52	70	68	72	52	39	30	30
Natchez.												
1849	.....	.....	.....	.....	59	68	71	70	61	45	40	26
1850	32	27	32	40	46	56	68	69	58	36	24	18
1851	29	30	29	46	50	66	.....	.....	.....	.....	.....	.....

Lowest observed temperatures in the cane and cotton districts—Continued.

Years and stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Jackson, Miss.												
1849	.....	.....	.....	.....	.....	66	68	71	52	34	33	18
1850	28	20	30	30	47	53	68	72	56	29	23	17
1851	32	29	32	42	42	.....	62	65	41	32	28	20
1852	11	32	31	37	62	57	61	62	52	43	27	30
1853	23	26	34	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cedar Keys, Fla.												
1851	.....	.....	.....	.....	62	68	76	72	53	51	44	31
1852	22	44	47	54	63	67	73	71	69	61	45	43
1863	37	37	50	54	67	73	77	76	67	52	52	39
Whitemarsh island, Ga.												
1849	.....	.....	.....	.....	48	66	64	71	58	48	37	36
1850	31	25	39	44	54	58	71	70	59	37	33	28
1851	23	27	34	45	53	60	70	65	42	38	29	18
1852	10	28	31	44	51	61	72	65	60	50	33	31
1853	26	30	34	50	60	67	74	72	59	40	40	29

Lowest temperatures at stations near the limit of the cotton region.

Years and stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Chapel Hill, N. C.												
1849	.....	.....	.....	.....	47	58	55	60	51	35	32	20
1850	18	12	27	30	47	55	65	62	51	32	24	18
1851	6	11	30	38	40	54	65	56	46	33	28	10
1852	1	23	27	34	41	51	66	59	51	40	29	29
1853	16	26	15	37	48	60	62	57	43	32	28	19
St. John's, Berkeley, S. C.												
1846	.....	.....	29	40	55	58	62	71	58	40	22	24
1847	15	27	28	37	43	64	64	68	53	44	29	21
1848	24	25	27	39	47	58	70	66	51	42	25	33
1849	17	21	37	27	47	63	61	69	53	42	33	31
1850	26	24	31	34	39	53	69	69	53	37	29	28
1851	14	10	20	36	37	52	63	61	43	31	20	10
1852	7	18	26	32	40	52	68	62	58	45	25	26
1853	18	21	25	33	38	57	63	58	49	30	24	34
Erie, Ala.												
1849	.....	.....	.....	39	60	68	69	74	61	47	37	19
1850	27	17	30	40	46	61	72	73	65	32	24	21
1851	21	27	26	43	45	63	60	68	42	30	27	10
1852	2	28	26	42	57	58	69	64	56	48	29	28
Huntsville, Ala.												
1831	18	13	20	32	42	56	60	56	39	33	24	0
1832	—9	14	13	44	50	53	58	57	50	39	28	24
1833	16	23	11	36	55	56	59	57	52	42	24	27
1834	11	29	27	38	45	58	62	61	48	29	24	24
1835	22	—4	12	37	46	54	51	54	43	33	19	22
1836	—9	—7	21	34	50	58	58	58	46	29	14	9
1837	13	17	27	31	40	50	60	54	46	35	24	22
1838	18	8	31	33	41	50	64	63	40	29	20	—7
1839	22	16	13	37	42	52	60	62	43	42	13	17
Lebanon, Tenn.												
1851	6	12	13	33	33	58	57	62	35	19	19	2
1852	—7	21	15	32	39	47	60	57	46	33	18	20
1853	17	10.7	23	40	49	64	71	59	46	31	27	17
Memphis.												
1849	.....	.....	.....	.....	.....	.....	.....	68	48	40	36	.....
1850	30	16	30	40	44	52	61	64	50	30	28	20
1851	17	24	.....	36	38	58	58	65	40	29	24	19
1852	—2	28	25	37	45	50	61	59	50	40	.....	.....
1853	20	22	30	43	49	72	68	60	50	36	34	20
San Antonio, Texas.												
1850	37	29	35	38	43	66	70	67	61	43	34	12
1851	27	30	24	58	63	76	77	77	74	61	32	20

NOTES OF THE HISTORY AND CULTIVATION OF COTTON ON THE EASTERN CONTINENT.

The following quotations from Schouw's Climatology may be inserted here, though they are not concurred in entirely by other authorities on historical points:

"Herodotus, who lived in the fifth century before Christ, reports that the Indians had a plant which bore, instead of fruit, a wool like that of sheep, but finer and better, of which they made clothes; and Arrian narrates that the Indians made their clothes of a kind of white flax which grew on trees. Other nations do not seem to have cultivated the plant at that time, or even to have used cotton; at all events, only exceptionally, as a rare and expensive stuff. Thus it is assumed that the precious material called *byssus*, spoken of among the Jews, was cotton. The growth of cotton and its use seem to have become diffused shortly after the birth of Christ. Strabo, in the first century of our era, speaks of cotton being cultivated and manufactured in Susiana, on the Persian Gulf; and Pliny mentions that the plant was cultivated not only in India, but in Upper Egypt, and says that the Egyptian priests used the material there grown for clothing. In all probability the Arabs brought the cultivation of cotton into Europe. In the time of Mahomet, the use of cotton was general among them, and the first country of Europe in which mention is made of the cotton-plant as an object of cultivation is Spain. An Arabian author mentions it as generally grown in the last-named country. Cotton culture did not come until later into Sicily, the South of Italy, and Greece; but cotton goods were brought from India, by Constantinople, to Europe, in the middle ages.

"Although this trade in cotton goods from India to Europe, partly by way of Constantinople and partly by way of Egypt, existed at a very early period, still the use of cotton stuffs was very limited throughout the middle ages, and in fact for long after.

"The most northern cultivation of cotton in Italy is near Naples, 41° north latitude, and particularly about Castleamare. Further south, it is found in Calabria and Sicily. When the trade of the Continent was closed under Napoleon, the Italian cotton culture was more considerable than at present. In Spain, cotton is cultivated on the south coast and on the east coast of Valencia, to 40° and 41° of latitude. It is even found on the plateaux. The cotton culture of Greece and the Greek islands is considerable, and it reaches to Constantinople, or about the same latitudes as in Western Europe. It occurs exceptionally in the Crimea, at 45°; but only on the south side of the high mountains, which afford shelter and cause a locally warm climate. The Asiatic coasts of the Mediterranean, Asia Minor, Syria, as also the Asiatic islands, produce cotton. In Egypt, especially of late years, Mahomet Ali has made great attempts to extend the cultivation of cotton, and it is grown all along the North African coast. Although Asia is colder than Europe in the same latitudes, the cultivation of cotton extends as far towards the north there as elsewhere, as it is met with in China and Bokhara, up to 40° and 41° north latitude—probably on account of the comparatively dry and warm summer; and in China and Japan it reaches the same limits."

CULTIVATION OF THE VINE IN THE UNITED STATES.

The determination of the capacity of our climate for this cultivation is more difficult than for the chief agricultural staples, as it is in every respect more difficult in its requirements. The temperature is not a precise guide, neither in the form of means for the proper periods, nor of extremes in the same manner, though there are limits of a general character on both points, and a wide range of doubtful ground must then be passed over to reach both lines of absolute limit. The climate of the United States, generally, has a great excess of humidity as compared with the vine-growing districts of Europe; and this is exhibited in a much greater amount of rain for the year, and in periods of greater saturation of the surface atmosphere. Our atmosphere is often supposed to be drier, and, as a mean, may perhaps be so, as it is certainly at times very much more dry and elastic. But these periods alternate with others of excessive saturation, and of such extreme character in this respect, and such considerable duration, that they influence delicate growths and fruits, as the European grape particularly, in a very unfavorable manner. It is evidently due more to this condition than to any other circumstance that our measures of temperature fail to be as decisive and intelligible as they are in Europe in respect to this cultivation.

In Europe, also, cultivation has attained to the extreme limits of climatic capacity; and the uniformity of all the conditions is such that it may be defined there with great precision, and by very narrow differences of temperature. Thus the sheltered valleys of Northern France and of the Rhine are extremely successful as wine districts, while the greater portion of the interior both of France and Germany, stretching southward over five degrees of latitude from the vineyards of Nassau and the Maine, fails in climate. These interior portions rise gradually as plateaux, and are both too cold and too variable for wine districts, though the measure of absolute difference in temperature is very narrow.

On the whole, the conditions and districts for Europe are capable of very precise determination, and may be used as rigid definitions if we are able to find districts here where they are reproduced. But in their application to our climate we find the amount of rain and the atmospheric humidity first to vary greatly, and in such a manner as to quite unsettle the precision of temperature measurements. Our extremes of temperature are also greater, and may, of themselves, deserve to be especially characterized in districts, first, of greater or less liability to extremes, injuring summer growth; and next, of liability to absolutely destructive extremes, destroying the whole plant.

Generally, we may compare mean temperatures with advantage as climatic guides on the larger scale, and as indicative of the range of native species from which we may develop some varieties with characteristics suited to our general climate. Subsequently, the humidity and distribution of rain may show what the probable differences of climate are in this respect, and what may be reasonably anticipated of comparison and experiment upon the whole subject of this cultivation.

European cultivation has undoubtedly done all for the extension of

the vine culture that may be done. It passes the natural limit there by this excess of care; but it is only necessary here to consider the safe and recognised range of general cultivation. Kaemtz assigns latitude 47° 30′ on the Atlantic coast of France, latitude 49° in the interior, and 50° 20′ at Coblentz, on the Rhine, for the east. "In Germany it does not pass 51°, to which line it is sensibly parallel in Eastern Europe." These are extreme limits, and the true wine districts fall considerably lower, and probably should be designated as not above the 46th parallel on the Atlantic coast, 47° 30′ in the interior, and irregularly in the valley of the Rhine, somewhat beyond the 49th. Bordeaux, Dijon, and Manheim would represent these climates very correctly for France; and in Germany the elevations are such that beyond the Rhine they scarcely reappear north of the valley of the Danube and the climate of Vienna. By reference to the table of temperatures for Europe, it will be seen that the mean temperature of these localities is from 68° to 70° for the mean of the three months of summer, and for the warmest month 69° to 73°. In Central France, the elevations increase from Paris southward so considerably that the department of Aveyron, latitude 44°, and 2,066 feet above the sea, is, on the whole, less favorable to this culture than Paris itself.* No considerable district in this central portion of France affords a decisively favorable climate for the vine, and the successful localities are wholly in the valleys of the larger rivers.

The mean annual temperature is not a precise guide in this respect, as may readily be seen by comparing European mean temperatures for the year with those of America. Nantucket, Newport, New Haven,

---

* *M. Blondeau*, of Rodez, Aveyron, South France, in an instructive note in the *Annuaire Meteorologique de France* for 1850, has the following remarks:

"The determination of the conditions of climate in which the culture of the vine is possible, is of practical as well as theoretical interest. Knowing that any particular locality has long been devoted to this culture, we are able, as has been determined by MM. Arago and Furster, to fix, with a satisfactory approximation, the mean temperature of this locality, and, consequently, to know if the climate has undergone any change in successive periods. We can, again, by studying with care the circumstances prejudicial to the development of the vine, avoid the fruitless attempts which often cause the ruin of agriculturists who undertake this culture where it is impossible, industrially speaking. We believe, then, that with this double knowledge, it is possible to ascertain what are the causes which prevent this culture, and to fix the limits of successful prosecution of it with precision.

"The department of Aveyron offers very favorable conditions for the study of these questions, as it is situated at the extreme limits of this cultivation. In the environs of Rodez, but a single plantation of vines appears; and, again, fortunately for the solution of this question, it is very rare that the fruits produced attain to sufficient maturity to make good wine. So this unproductive culture has been completely abandoned, and this single vineyard remains as a definite mark of the limit beyond which vineyards may not go.

"By observation, continued during five years, we have been enabled to fix the mean temperature of Rodez at 50°.5, which differs little from that of Paris—the latter being comprised between 51° and 51°.4. The slight difference of some tenths of degrees between the temperature of these two places does not give the solution of the failure of the grape to ripen in the principal localities of Aveyron, whilst it ripens very well at localities elsewhere having a much lower mean annual temperature. Thus, on the Rhine, the vine ripens with a mean annual temperature of 48°.2 to 49°.1; and even at Berlin, with a temperature of 47°.3, a wine of good quality is produced. It is necessary, therefore, to seek the cause of this failure at Rodez in other causes than mean temperature.

"They will be found, it is believed, in the exposure to west and northwest winds, which re

and New York, on the Atlantic coast, and Monterey and San Francisco on the Pacific, are equal in mean annual temperature to Paris; yet the mutual relations of these localities in this respect are widely different. M. Blondeau, in the subjoined note, has fully shown that the mean annual temperature is not a guide for the great central plateau of France; and that many features of the single condition of temperature enter into this consideration, even where the remaining conditions of climate, or of humidity particularly, remain uniform.

Boussingault gives a table of temperatures actually found to be favorable and unfavorable in a well-established vineyard on the northern border of this cultivation in Germany. The three months of summer alone are not decisive, as may be seen by this table, and in the note of Blondeau; and it is clear that the whole period of growth, with the mean for each of the three summer months, must enter into the consideration.

---

duce the temperature in spring a degree below the mean temperature of that season at Paris. The following table of results of several years' observations exhibits this fact:

Mean temperatures of spring.

	Paris.	Rodez.
1846	59°	57°.2
1847	55°.7	54°.7
1848	59°.4	56°.5

"The winds referred to, blowing violently at the time when the blossoms of the vine appear, destroy these tender growths with cold or actual frosts. The varieties of the vine cultivated here cannot withstand these conditions as hardier plants may, or varieties of later appearance in spring, and of a thicker-skinned fruit, ripening slowly.

"The vines cultivated in sheltered localities produce a small black fruit, with a thick skin, and with very small seeds. These vines blossom late, appearing near the middle of June, and the fruit is not gathered until the middle of October. The amount of heat required to ripen these grapes, which produce wine of an inferior quality only, is greater than that which is necessary for the best varieties.

"The mean temperature of summer in Aveyron is, in truth, even greater than that of Paris, as is shown by comparison of different exposures—that to the north giving equal means from observations for several years, and that to the south exhibiting much higher temperatures from the greater number of clear days, as compared with Northern France. The results of observations are—

Summer.

	Paris.	Rodez.
1846	69°	61°.9
1848	63°.8	63°.8

TEMPERATURES FAVORABLE TO THE VINE.

Comparison of different years at the vineyard of Schmalzberg, Lampertslock, Flanders.—(Boussingault Rur. Econ., p. 255.)

	Mean temperature of whole time of growth.	Mean temperature of the summer.	Gallons of wine per acre.	Per-centage of alcohol.
1833	58°.4	63°.1	311	5.0
1834	63°.1	68°.5	413	11.2
1835	60°.4	67°	625	8.1
1836	60°.4	71°	544	7.1
1837	59°.3	66°	184	7.7

In 1833 and 1837 the wine was scarcely drinkable. In 1834 and 1835, unusually good.

In the sharper curve of monthly differences which characterizes the climate of the United States in contrast with Europe, it becomes still more necessary to compare the temperatures of each of the months which may influence the growth of the vine. Extreme months and single non-periodic extremes of temperature are quite as important here as on the elevated plateaux of France and Germany; and with

"And as the grape requires four months, or one hundred and twenty days, to come to maturity, the result is that it receives an amount of heat much greater than that required to ripen this fruit at Paris.

"From the 15th of June to October 15, the mean temperature of Rodez being 16° centigrade, we have, for the sum of temperatures for one hundred and twenty days, 1,920° (c); and solar heat for fifty clear days, at 18° (c), and seventy cloudy days, at 2°.5 (c), a sum of 1,085° (c); the entire sum being 3,005° (c.)

"From this we prove that the grape at Rodez demands, for its perfect growth, a much greater quantity of heat than is necessary for the varieties cultivated at Paris, which only demand 2,676° of heat, and a stronger grape than that at Berlin, which only requires 2,337° (c.)

"We have based our calculations on the mean temperature of Rodez; and while we have observed that in this locality the cultivation of the vine has been almost entirely abandoned, taking refuge in a sheltered valley some leagues from Rodez, in which they cultivate the vines mentioned to a great extent, the village of Marcillac is the centre of this culture; and this locality, in a low valley sheltered on every side by mountains, has a mean temperature of 55°.4. This is nearly the same as that of Bordeaux; and the quality of the wine produced there is much like that at Suresnes. If we then hold to the mean temperature as a guide, we will regard the locality of Marcillac as very favorable to the vine, whilst it is really the limit of its successful cultivation; proving, again, that when the vine is not effectually sheltered against the cold winds of spring, the hardy varieties alone may be cultivated, and those which produce less saccharine matter and more acid, furnishing a sharp wine with little alcohol. Some attempts have lately been made to acclimate at Marcillac the varieties grown at Bourgogne, and some species from strong stocks. We would not make haste to form opinions from these trials, but we fear much that the vines cultivated successfully on the lower plains will not bear the cold winds which prevail in spring throughout the whole central plateau of France.

"The purpose of this note has been to show that the mean annual temperature of a locality is not sufficient to determine whether the vine culture will be entirely successful, and that it is necessary to inquire whether other circumstances do not interpose insuperable difficulties. The vine is only cultivated in a very limited portion of the central plateau of France, and we must attribute this fact not so much to the mean temperatures for the year, as to the cold winds, which lower the temperature at critical seasons, and render the cultivation of early kinds impossible, even in sheltered positions."

[The reference in this note to the "*amount of heat*" required to mature the grape in the two cases is scarcely in keeping with its otherwise just views, and may be passed over as wholly unimportant. It could not, however, be readily severed from its connexion in the note.]

mean temperatures for the summer, or for the entire period of growth, fully equal to the European requirement, we may still find these extremes to have an injurious effect, and possibly to be fatal to the cultivation.

Winter temperatures are important also in some districts here, and the annual mean which would indicate that open cultivation, or that without winter protection, would be quite safe, proves not to be reliable in this respect. Such is the case on the open plains and prairies of the Western States from 38° of latitude northward, as has been observed by Dr. Ryhiner, of Highland, Illinois, in a careful examination of the question of introducing the European grape. The mean annual temperature observed by him for a period of twelve years is 55°, and the mean for the summer 76°.5. These equal the most successful vine climates of France and Italy. Dr. Ryhiner says of his experiments: "The mean temperatures show our spring, summer, and autumn to be very nearly as warm as Bordeaux, while our mean winter temperature is as low as that of Frankfort-on-the-Maine, and lower than that of the valley of the Rhine, as far as the grape is cultivated. This would show sufficiently that the European grape could not be cultivated with advantage, and actual experience proves it. Of a large number of vines from the Rhine and other sections of Germany and of France, planted here four or five years ago, not one survives; they generally perished during winter, the plants being frost-killed several inches into the ground."

The mean winter temperature at this locality is 33°.4, or somewhat above that indicated by Humboldt as the limit of the vine, and it is undoubtedly owing to the greater severity of non-periodic extremes that the complete destruction of the European grape is due.

Comparing the mean annual summer and autumn temperatures at this locality, with those given in Humboldt's table, we find the following results:

	Latitude.	Spring.	Summer.	Autumn.	Winter.	Year.	Yrs. observed.
Highland	38° 40′	55°.7	76°.5	55°.5	33°.4	55°.3	12
Bordeaux	44 50	56°.0	71°.0	58°.0	43°.0	57°.0	10
Manheim	49 29	50°.8	67°.1	49°.5	34°.6	50°.6	12
Berlin	52 31	46°.6	63°.6	47°.5	31°.0	47°.5	23
Cherbourg	49 39	50°.8	61°.7	54°.3	41°.5	52°.1	3
Cincinnati	39 06	53°.8	73°.7	53°.6	33°.8	53°.7	18

This table embraces one known successful and one known unsuccessful district in the United States; and of the European list Bordeaux and Manheim are successful, Berlin partially so, and Cherbourg wholly unproductive. These comparisons are given here to show that temperature conditions alone may not be taken as decisive, especially for the United States. For the year, 49° is given by Humboldt as the minimum requirement of the grape; yet we find its cultivation impossible at localities having an annual mean of 55°, and successful cultivation in others having but 47° and 48° in the United States. The western shores and islands of Lake Erie, in 41½° of latitude, are scarcely

inferior to Cincinnati in capacity for grape culture, and the mean annual temperature is 48°; at Oberlin, Ohio, 48°.3. For temperature conditions only, we have, therefore, no regular guide in our climates, and we require closer analyses of mean results, and more careful attention to the measure of non-periodic extremes, than is necessary in considering the same range in Europe.

As a rule, the culture of the European varieties most valued is very much restricted in the United States, and our variable thermal conditions and variable humidity are injurious for most if not all districts east of the Rocky mountains. We have more directly to consider whether any grape yielding the amount of saccharine matter necessary for the manufacture of wine, or for the perfection of the fruit itself, may be produced, and what the peculiarities of climate are which modify the European types. Our requirement is for a more hardy plant in its capacity to endure temperature extremes, and the still greater extremes of humidity.

Very little consideration is given to the amount of rain or degree of humidity in the examination of this subject in Europe, and this inattention to it arises mainly from the fact that this condition is generally so favorable, and so rarely injurious as a special extreme. Districts of like temperature here receive nearly twice the amount of rain falling there; and though our rains are of less duration, and occur on a less number of days of the summer, particularly the degree of saturation at these periods is much greater, and the amount of water falling is proportioned to this excess. The delicate structure of the European grape always suffers injury from this excess of humidity, and the extremes of temperature add another considerable measure of risk—together sufficient quite to discourage attempts to acclimatize here the favorite vines of France and Germany growing on the northern border of the wine districts of Europe.

These humid conditions and extremes are also non-periodic in all respects, and the most difficult of all elements of climate to measure in such manner as to assign to them precise values, and to permit comparisons of a general sort. It cannot be said that certain periods are characterized by these extremes as an invariable rule, but rather that they are liable to them, and that they may occur at any time. The warmer districts in which the vine may be cultivated are liable in a greater degree than other portions; the amount of water falling in the summer months being the best measure of this liability and of its possible effects. There is less precision on this point in direct measures of humidity in monthly means, for the reason that these periods alternate with those which have the most extreme opposite character—several changes perhaps occurring in the same month.

In the following table a selection of stations is given which represent the known wine districts both of Europe and the United States, with the mean temperatures of the seasons and year, the mean amount of summer rains, and some partial results of mean humidity deduced from the observation of the temperature of evaporation as indicated by the wet-bulb thermometer.

Humboldt refers to the excellence of the grapes grown at Astrachan, and pronounces them equal to the best of Italy. It would be interest-

ing to compare the varieties grown there with those of Western Europe; and as the temperature range at Astrachan is even more extreme than in any part of the United States, varieties found to succeed there might be transplanted here, or be made the model of some part of American cultivation.

. Climate of the vine-growing districts of the United States.

Places.	Latitude	Elevation.	Temperature.					Amount of rain—inches.				
			Spring.	Summer.	Autumn.	Winter.	Year.	Spring.	Summer.	Autumn.	Winter.	Year.
Baltimore, Md.....	39° 17′	193 ft.	52.3	74.3	55.6	34.3	54.1	11.5	13.7	10.2	9.0	44.4
Scuppernong, N. C....	35 50	30	58.6	74.7	60.0	43.3	59.1	*10.3	15.4	10.9	10.6	47.3
Chapel Hill, N. C.....	35 54	570	59.3	75.9	60.2	42.9	59.1	.....	.....	.....	.....	.....
Camden, S. C.....	34 15	250	62.4	77.9	62.6	47.4	62.6	13.6	20.8	9.8	10.1	54.4
Sparta, Ga.....	33 17	550	63.9	79.2	68.2	46.5	63.2	11.1	10.5	14.6	15.5	51.7
Huntsville, Ala.....	34 45	600 (?)	59.9	75.6	59.8	42.1	59.7	14.9	14.6	10.0	14.4	53.9
San Antonio, Texas..	29 25	600	70.5	82.2	71.4	54.2	69.6	8.9	9.4	6.0	8.5	32.8
Nashville, Tenn.....	39 09	533	59.4	77.5	58.2	39.2	58.6	14.1	14.0	12.3	12.4	52.8
Cincinnati, Ohio.....	39 06	550	54.3	73.0	55.0	32.9	53.8	11.9	14.2	10.0	11.3	47.5
Cleveland, Ohio.....	41 42	625	46.4	67.0	51.4	30.8	48.9	6.5	8.7	7.7	9.4	32.3
Oberlin, Ohio.....	41 23	799	45.6	69.3	49.6	28.5	48.3	9.3	11.4	10.0	5.2	35.9
Ann Arbor, Mich.....	42 10	750	45.5	66.3	48.4	25.3	46.4	7.3	11.2	7.0	3.1	28.6
Battle Creek, Mich...	42 20	800	44.4	70.2	49.9	26.8	47.8	7.5	11.2	7.1	6.8	32.7
New Harmony, Ind...	38 11	400 (?)	58.7	76.9	54.9	37.6	57.0	10.5	12.8	7.2	12.3	42.8
Highland, Ill.....	38 40	600 (?)	56.9	77.9	56.8	34.1	56.4	†12.2	13.3	9.2	7.1	41.7
St. Louis, Mo.....	38 37	450	56.9	76.2	54.4	33.9	55.5	12.7	14.0	8.7	7.0	42.5
Fort Madison, Iowa ..	40 38	600 (?)	50.5	73.2	53.1	26.3	50.8	15.3	15.9	14.5	4.7	50.5
Fort Arbuckle.....	35 15	1,790	61.3	78.1	61.1	41.8	60.6	7.1	10.0	10.4	7.9	35.5
Albuquerque, N. M...	35 13	4,576	52.4	73.1	55.5	34.4	53.8	0.6	5.6	1.2	1.0	8.4
El Paso, N. M., (Fort Fillmore).....	32 03	3,940	60.4	80.4	61.6	44.9	61.8	0.6	6.6	4.9	0.3	12.4
Rancho del Chino, Cal.	34 00	500 (?)	60.8	72.6	64.9	54.8	63.3	2.5	0.1	1.6	5.5	9.7

NOTES.

Baltimore, Dr. Edmondson, 8 years' observations.

*Scuppernong, Rev. J. A. Shepherd, 2 years' temperature. Rain at Fort Monroe, near Norfolk, Virginia, and for 16 years. This locality would represent the district in which Scuppernong is situated quite correctly.

Chapel Hill, Professor Phillips, 8 years. No observations of amount of rain have been made in this vicinity.

Camden, Thornton Carpenter, esq., 4 years.

Sparta, Dr. Pendleton, 2 years—1852–53

Huntsville, Rev. Dr. Allan, 12 years—1831 to 1842.

San Antonio, assistant surgeon military post, 3 years—1850 to 1852.

Nashville, Professor Hamilton, 7 years—1840 to 1845, and 1850.

Cincinnati, Professor Ray, 16 years.

Cleveland, Hon. E. Wade, 1½ year.

Oberlin, Professor Fairchild, 3 years.

Ann Arbor, "L. S. H.," 3 years.

Battle Creek, Dr. Campbell, 3⅔ years.

New Harmony, Dr. Troost, 2 years—1826 to 1828.

†Highland, Dr. Ryhiner, 12 years' temperature observations. The amount of rain is from the record of Mr. Hall at Athens, Illinois, about 60 miles north of this locality, but in the same general surface and exposure.

St. Louis, Dr. Engelman, 16 years.

Fort Madison, D. McCready, 4 years.

Fort Arbuckle, on the Canadian river, 2 years' military observations, 1851–52. From this point to New Mexico wild vines are very abundant.

Albuquerque, surgeon military post, 3 years—1850 to 1852.

Fort Fillmore, near El Paso, surgeon military post, 1 year—1852.

Rancho del Chino, California, (the southern valleys of California, near Los Angelos, and in a superior vine district,) one and a half year's observations at the military post. The rain is given from measurements at San Diego, a lower position, on the coast. The summer rain is more abundant in this very superior vine district, which embraces the spurs and terminus of the coast range of mountains in the counties of Los Angelos and Santa Barbara of California. By the State census of 1852, Los Angelos county is reported as having 350,000 grape vines, and as producing 57,355 gallons of wine. Santa Barbara, Santa Clara, and Solano counties, have a large produce also.

Climate of the principal European vine districts.

Places.	Latitude	Elevation.	Temperature.					Amount of rain—inches.				
			Spring.	Summer.	Autumn.	Winter.	Year.	Spring.	Summer.	Autumn.	Winter.	Year.
Lisbon, Portugal.....	38° 42′	Sea level.	59.6	70.9	62.5	52.5	61.4	.....	.....	.....	.....	.....
Funchal, Madeira.....	32 37	1,200	65.6	71.3	69.0	61.9	66.9	.....	.....	.....	.....	.....
Turin, Piedmont.....	45 11	857	53.7	71.5	53.8	33.5	53.1	8.2	9.0	11.5	7.8	36.5
Vienne, Lyons, valley of Rhone.....	45 32	300 (?)	56.2	71.8	54.6	38.7	55.3	10.2	9.5	10.4	4.3	34.4
Bordeaux, W. France.	44 50	Sea level.	56.1	71.1	57.9	43.1	57.0	7.3	7.4	10.3	9.0	34.0
St. Michael's, Azores..	37 50	Sea level.	60.6	72.5	65.2	57.3	63.9	6.6	3.6	9.5	11.7	31.4
Vevay, Switzerland....	46 28	1,250	50.5	65.7	51.0	35.9	50.8	7.9	10.8	11.1	3.9	33.8
Manheim, Rhine.....	49 29	258	50.1	67.4	49.9	33.6	50.3	6.3	8.0	7.4	5.3	27.0
Dijon, E. France.....	47 19	700	53.3	69.6	53.3	35.4	52.9	7.1	7.5	9.3	7.3	31.2
Chalons, N. E. France.	48 57	492	51.0	66.8	53.8	37.1	52.2	5.4	6.2	6.1	5.6	23.3
Bucharest, valley of Danube.....	44 27	(?)	44.1	65.3	50.1	27.8	46.8	.....	.....	.....	.....	.....
Astrachan, Casp'n sea.	46 21	Sea level.	52.6	75.9	52.4	19.2	50.0	.....	.....	.....	.....	.....

NOTES.

Lisbon.—The temperatures represent the vine-growing districts of Portugal and Spain very nearly, though the summer temperatures are lower at Lisbon. No observations of amount of rain are accessible for any of these districts. The summer is, however, known to be dry.

Turin.—Temperature observations for many years. Distribution of rain from Schouw's table for the "Transpadane Belt" of the climate of Italy. The elevated districts of Northern Italy, yet lower than the Alpine, are very well represented by the table.

Vienna.—The amount of rain is the mean fall in the basin of the Rhone for five years through the period of vegetation, April to September; for the remainder of the year the quantities are for 1848 only. This is a favorite wine district.

Bordeaux.—Number of years of observation unknown.

St. Michael's.—Ten years' observations, by T. Hunt. Brit. Assoc. Reps.

Funchal, Madeira.—The vine district is at an elevation of 1,200 to 1,500 feet, and its temperatures less than than those here given. The amount of rain is quite similar to that at the Azores.

Vevay.—The amount of rain is given as measured at Geneva, which is unfavorable to the vine. Vevay, for which no observations of this sort exist, is only known to have less in summer.

Manheim.—Annual mean of rain for Strasburg, and the divisions among the seasons according to Kaemtz's table for the east of France.

Dijon.—Twenty years' observations.

Chalons.—Somewhat more elevated and exposed than the favorite vine districts of the Marne, for no precise locality of which are there any reliable series.

Bucharest.—Two years' observations from Dové.

Astrachan.—A series from Dové, without date.

The most conspicuous feature of this comparison is the excess of temperature and amount of rain for the summer in America, as compared with Europe. Both these measures are here so far in excess, compared with districts in which a similar extent of vine culture exists in Europe, that the parallel seems to fail of significance or of application in this connexion. We are, in truth, thrown upon a new trial, and upon the development of new or native varieties which will bear the peculiarities of climate, in regard to which we differ from Europe too widely to transfer their most successful varieties.

In the districts where the temperature and amount of rain are less excessive in summer, the opposite extremes of winter and spring temperatures are quite certain to become injurious. A district bordering the southern and western portions of Lake Erie is more favorable in this respect than any other on the Atlantic side of the Rocky mountains; and it will ultimately prove capable of a very liberal extension of vine culture. None of the stations given in the table represent it precisely, though Oberlin, Ohio, and Ann Arbor, Michigan, differ only in being somewhat more exposed and extreme in temperature at the colder seasons. The amount of humidity is much lower here in summer than elsewhere; and it corresponds more nearly than any other

district with the vine-growing districts of the Rhine both in temperature and amount of rain.

The southern portions of the Alleghany mountains, bordering the South Atlantic States and those of the Gulf, possess general characteristics greatly favorable. They have less humidity than the plains below them, reversing the European law of humidity and aqueous precipitation in this respect; and their exposures southward and sheltered valleys must favor this cultivation to a very great degree.

The present wine districts of Cincinnati, and other localities on the Ohio, and those on the Missouri, at Herman, are very successful in every point except the liability to injury from excess of humidity and of rains. The general climate will always present difficulties in this respect which the utmost care in cultivation and choice of position can only modify in slight degree.

In the lower portion of the valley of the Rio Grande, in New Mexico, the nearest approach to equable temperatures and the requisite low humidity is attained. In the vicinity of El Paso, vineyards are numerous and successful; the rarified atmosphere and slight precipitation of rain being more signally favorable than in any portion of the continent eastward. The cultivable districts in this latitude towards the Pacific must present many localities of proper adaptation in their peculiar conditions, though the extent of these is not great. The southern valleys of California, sufficiently distant from the seacoast and from the loftier sierras, would be unusually favorable.

Upon this point recent information from the southern portion of California is particularly favorable, and the probable results here indicated appear to be fully sustained. As these features of climate, which are known to be so decisive of the measure of success there, attain singular completeness, as it may be said—that is, the measure of humidity and of temperature becoming of the most perfect mutual proportion—the result is the most extraordinary perfection of vegetable development. This is true of other products—of wheat and the Cereals generally, of some varieties of roots, of particular species of trees, and of the vine and fruits; this in distinct localities, however, as if a variable division of the climate had been so arranged as to present conditions in the highest degree favorable to each product in turn.

The precise range of different varieties of the grape, whether native or European, does not enter into the present purpose; and the consideration of this point, which is properly with actual cultivators and experimenters, should so remain. The distinctions of this sort are in a more precise climatology than may be attained in this general comparison; and there are considerations not capable of being embraced in any climatology. We may indicate the range of the more delicate native varieties now cultivated, however, and also the range of the rude native or wild varieties, which pass through almost every peculiarity and shade of excellence as fruits.

In this last view, the range of wild varieties, of a certain class, is very great on this continent. Nearly the entire area of the United States in which Indian corn may be grown, produces, spontaneously, vigorous native species of the grape; and though the edible and valuable varieties are far south in this wild condition, there must be some

significance in this extreme range of the ruder varieties. It is believed that this limit is the possible limit of this cultivation under the high preparation and great care which are given this culture in Europe, and which may be given it here—that is to say, the more perfect fruits, when thoroughly acclimatized or developed from the wild varieties, may be extended, by skilful cultivation, over the whole area in which the native vine of any sort may be spontaneously produced.

To attain this extension in this country, as before remarked, we must develop especial features of adaptation to our peculiar climate. The production of seedlings, and the thorough discussion of the special requirements, is proceeding rapidly, and may safely be left to the culturists themselves. We have now two varieties, the Isabella and Catawba, which, if not both native, suit our peculiar climate admirably, and may be grown over a very large area where the European grape wholly fails. Central New York, Ohio, some parts of Michigan, Indiana, parts of Illinois and Iowa, &c., are successful districts with one or both these varieties, with slight protection. In the Ohio valley and Missouri, and in some parts of Western Ohio, near the extremity of Lake Erie, they fully succeed without protection, and are liable only to the injury resulting from humidity, rains, and other causes than temperature. The temperature limits of these districts can be stated only negatively, as not below 70° for the warmest summer month, nor below 30° for the coldest month of winter. Districts of 70° and more for July, may have too low a winter temperature, and such is the case in most of Michigan, the northern parts of Indiana, Illinois, and Iowa.

For the greater portion of the United States it may readily be seen that the climate will not permit the transfer of European varieties of the vine, and that though the conditions are generally favorable to growths requiring semi-tropical temperatures, they are rudely so, and we have extremes both of temperature and of humidity often injurious to delicate fruits. Varieties may be developed by cultivation which will possess adaptation to these rude characteristics of climate, however, and which will give larger production with an equal though peculiar quality.

Lowest temperatures observed at Hillsborough, Ohio—Latitude 39° 15′.—*Rev. J. McD. Matthews.*

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1836	—14	—11	—8	22	35	50	52	54	34	24	10	—1
1837	4	—3	15	23	32	44	56	44	36	22	22	2
1838	4	—22	6	24	30	46	52	54	34	26	9	—5
1839	6	6	—10	28	30	46	51	48	30	28	2	2
1840	—2	4	16	24	36	44	50	54	.....	.....	15	4
1841	—8	1	13	28	34	52	55	52	20	26	20	10
1842	9	—4	23	30	38	42	52	46	40	28	2	1
1843	4	—5	—1	24	40	40	56	56	42	22	21	12
1844	—1	10	14	27	37	48	62	.....	38	26	12	11
1845	18	8	13	18	36	51	53	55	.....	26	9	—12
1846	7	1	17	31	43	48	52	62	47	31	16	18
1847	—4	5	11	24	38	47	52	48	40	27	16	0
1848	—4	13	2	32	42	47	54	56	36	32	22	19
1849	5	—2	25	22	42	56	54	56	42	36	22	—2
1850	4	—2	14	24	36	44	60	54	40	30	24	11
1851	—2	14	20	27	27	48	50	50	39	24	22	—10
1852	—10	14	8	30	35	42	51	51	44	36	25	18
1853	6	—1	15	35	42	57	57	50	44	31	23	7

Lowest temperatures observed at Highland, Illinois—Latitude 38° 40′.—*Dr. Ryhiner.*

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1841	5	—2	19	33	34	48	54	51	43	17	14	15
1842	12	—2	23	37	37	38	48	36	35	28	3	—3
1843	—2	—4	2	22	36	40	50	50	49	23	18	9
1844	5	14	21	33	39	51	62	48	34	24	15	7
1845	18	12	16	20	35	50	54	57	38	21	3	—7
1846	16	—1	17	30	50	50	49	56	49	27	16	18
1847	—5	0	13	29	43	52	56	57	43	27	19	4
1848	—5	8	2	33	47	53	60	62	41	37	15	5
1849	6	—3	27	33	41	61	60	53	48	40	29	7
1850	8	—2	19	22	42	54	66	59	48	30	25	2
1851	—2	15	24	36	36	63	61	62	38	27	25	—4
1852	—15	15	19	32	48	54	59	58	48	40	20	17

NOTE.—Both these localities destroy the European grape by extremes of cold. Hillsborough is near the best grape districts of Southern Ohio, though its elevation is such as to give much greater single extremes of cold than Cincinnati. The difference in these cases is near five degrees of temperature for each marked extreme.

NOTES TO CULTIVATION OF THE VINE.

The limitations assigned to the wine districts of Europe are so various, as given by different authors, that it may be well to append here that of Gasparin, as given in his valuable work on the agriculture of France. It is instructive on many points of general climatology in Europe, and all these references aid much in the precise investigation of our own.

In Europe, also, the vine is made significant of permanent facts of climatology—the permanence or variableness of the constant quantities

of temperature and amount of rain. Some statistics are given by Gasparin in this view, which are not only sufficiently valuable in this particular purpose to repay their reproduction here, but they also possess a general interest as illustrating all questions involved in permanence of climate.

Gasparin's definition of the region of vines in Europe.

The culture of the vine embraces generally the region of olives; and beyond this the greater part of the plateau of Central Spain, and all the coasts west and north. In France, from the west coast at Guérande, near the mouth of the Loire, a line of limits extends in the direction of the Rhine, passing a little north of Paris, and terminating near Dresden. From this point it returns along the frontiers of Bohemia to its point of crossing the Rhine at Coblentz. It is then limited to the valley of this river and of the Lake Constance. Turning to the west at the approach of the high mountains of Switzerland, it does not include in its circuit the lower parts of the valleys of the Aar, the Theile, and Lake Leman, Geneva and Valais. Traversing the Alps in the middle of this last named canton, it follows the declivities southward to Venice, to return through lower Austria, Hungary, and Wallachia, eastward, to the Crimea. The mountainous districts of Servia and Bulgaria are the only exceptions to the districts here indicated, and are mostly limited to the production of Cereal grains and pasturage. These limits show an immense extent of country in which the vine is susceptible of cultivation, and which brings its fruits to maturity in Europe.

But there are important limitations to make in this general region. In the southern portions, the vine needs no shelter. If this is given, it is to increase the calorific effect for a particular purpose, and not at all in fear of a failure to obtain ripe fruit. In the northern part it is necessary to choose localities with a declivity and direct exposure southward—really, the climate of the open country some distance southward. In these cases, the vine is not so much the product of the country generally as of particular localities. We may therefore bound the vine region again by a line of limits to its growth in general exposures and without shelter, and this is found to be very nearly coincident with the limit of maize. To define its precise limits in this sense, we embrace in the circuit so designated all localities where it is actually so cultivated, but it may be better first to define the sub-region of maize. We may premise that the sub-region of the north, where this plant does not mature, is a climate of transition ranging into the region of the Cereals and nearly separated from that of the vines. This exception made, we may proceed to limit the sub-region of maize.

This limit is nearly defined by a line of latitude crossing the mouth of the Garonne at Spire. In the country this embraces, maize is everywhere cultivated in the plains bordering the Pyrenees, the valleys descending from the Jura, in Lombardy, the Venitian States, Austria, and Hungary, in the plains—in a word, the warmest and the most sunny, and, at the same time, on the coldest districts of this region. In the centre of the olive region, however, the cultivation of maize is restricted by summer droughts, where irrigation cannot be had. North of the

line indicated, neither the duration nor the intensity of solar heat is sufficient.

PERMANENCE OF CLIMATE.

Mean annual amount of rain falling at Paris for decades of years from 1689 *to* 1834.

	Inches.
1689 to 1698	20.748
1699 to 1708	19.095
1709 to 1718	19.410
1719 to 1728	14.095
1729 to 1738	15.315
1739 to 1748	16.693
1749 to 1754	20.236
1783 to 1788	21.417
1805 to 1814	19.016
1815 to 1824	21.417
1825 to 1834	22.166
109 years' mean	19.055

Thus in the basin of Paris the amount of rain, so far from having diminished, appears to have slightly augmented since 1689.

Cesaris has discovered the same appearance of increase from 1763 for the city of Milan. The numbers are also for decades of years.

	Inches.
1764 to 1773	36.776
1774 to 1783	34.094
1784 to 1793	39.056
1794 to 1803	38.268
1804 to 1813	40.632
1814 to 1824	48.190
61 years' mean	39.460

In tracing these results by the calculus of probabilities, M. Cesaris found that the possible error is less than two millimetres, more or less, and that the hypothesis of increase in amount is most probable.

At La Rochelle, M. Fleurian found, for the years 1777 to 1834, a mean quantity of 25.118 inches; and from 1835 to 1840, 28.898 inches. This also indicates an augmentation in the quantity of rain.

In the basin of the Rhone, the result of observations of Flangergos shows the following means:

	Inches.
1778 to 1787	33.150
1788 to 1797	35.356
1798 to 1807	36.458
1808 to 1817	40.632

Here is again the same tendency to increase.

Remark.—It may be said of these tables, and the remarks of Gasparin in this connexion, that the increase and decrease in amount of rain are both claimed to exist for districts but slightly separated, if not

quite the same. Schouw assigns a much less increase to Milan than that here given, and names localities of both decrease and increase in the south of Europe. The balance of these various results leaves the general result an unchanged quantity for the whole comparisons.

In America, no evidence of change in amount of rain has yet been obtained. In another connexion the fullest discussion of this point will be made by the aid of all existing observations. It is sufficient here to say, that no change or periodicity in amount has yet become apparent.

NOTICES OF GRAPE CULTIVATION AND NATURAL VINE CLIMATES IN VARIOUS PARTS OF THE UNITED STATES AND TERRITORIES.

In the preparation of the article on the climatology of the vine, many incidental notices of its growth, as native, and of the success of cultivation in particular localities, have been obtained. Many of these may be valuable, if reproduced; and as the matter of this article scarcely admitted their incorporation in its substance, they are grouped as mere notices here.

At various points on the southern boundary of California, from San Diego to the Colorado river, Lieut. Whipple found, in 1849, very superior vineyards, and a great abundance of the most delicious grapes. Very little care was taken in cultivation, and many of the estates were then abandoned by their original proprietors.

Other parties have found them very abundant and superior in all the valleys of Southern California, and in many cases quite wild, as well as in vineyards where the country was occupied. Unfortunately there has been no observation whether they were European varieties introduced by the missions, or whether native species were so cultivated.*

At Monterey, Mexico, it is too warm for the grape; vines are abundant, but they fail in fruit.

At Parras, west of Monterey, and at an elevation of 5,000 feet, the district has long been celebrated for its abundance of grapes and cheap wine.

At El Paso, a superior vine district exists, and excellent wines are made. The grapes are of Spanish origin; a blue variety is the best; and a superior white grape is grown.

In Texas, grapes cannot be grown upon the low plains; but wild grapes of a superior quality are abundant on the borders of the plains.

Wild grapes are also abundant on the Upper Canadian and Red rivers of the plains; but, both here and in Texas, none have been found without the characteristic thick skin of native grapes of the Southern United States.

At Natchez, Mississippi, several kinds of grape have been grown, but the wines made are variable, and the perfection of fine fruits uncertain.

In Northern Alabama and Georgia, grapes may be abundantly grown, and the native variety, called "Scuppernong," is quite successful.

The "Catawba" grape is claimed to be native at Catawba, Georgia,

* One of the principal varieties of the grape cultivated in California is stated to have been introduced from Malaga, by the Jesuits, about one hundred and fifty years ago. See statement of Mr. Waite, p. 299 of this Report. D. J. B.

and in parts of North Carolina. It was found near Asheville, North Carolina, by Col. Murray, in 1802, and by others in adjoining districts soon after.

The Scuppernong is much cultivated in the northern part of North Carolina, where it is native.

Boonville and Hermann, Missouri, are admirably adapted to the growth of the grape; and the native varieties are there much cultivated.

At Highland, Illinois, the European grape is destroyed by the winter, but many acres are covered by vineyards of the Catawba.

In Southern Indiana, as at Vevay, the vine is less successful than at Cincinnati.

TOBACCO.

The distinctive requirement of this staple, as respects climate, is very nearly the same as that of Indian corn. It differs somewhat in the degree of peculiarity, or in the measure of the differences from common climates, which constitute that requirement. This is shown in the European range of tobacco cultivation in France, Holland, and Germany, and the narrow difference which permits its extension over those countries extends only so much further the line of absolute and ultimate restriction. With a slightly milder temperature for the spring and autumn months, it will go to the line of 63° of mean temperature for July, or two degrees beyond the utmost limit of Indian corn, which is 65° for the same month. With lower temperatures than those found in Europe for the extreme months of the summer period, a higher temperature than 65° fails to secure a good growth.

Taking these measures, we may designate the climatological limit of tobacco cultivation for all parts of the United States. Wherever the growth of corn is completely successful, as in districts of a temperature for July above 68°, tobacco is and may be freely grown. Connecticut, Central New York, Ohio, and parts of Michigan, Indiana, Illinois, and part of Iowa, are all scarcely less adapted to tobacco culture than Kentucky and Virginia. The chief difference is a slight limitation of its period in time, and experience has fully shown that, to this extent, this may be very safely effected by a little care in selection of varieties.

Southward, its range is also like that of maize, with perhaps the exception of producing more desirable varieties in tropical climates. Cuba is the favorite of all known districts, indeed, and there seem to be no dangers to this plant from tropical excesses either of heat or humidity during the period of growth alone. In Cuba, extraordinary care is given to perfecting the peculiar qualities of the leaf, and the uniformity of climate at the close of the season is the greater of the advantages that island has over any part of the United States in accomplishing this end.* The ripening season is so often variable and extreme in the United States, that much is lost which is not really chargeable to the climate generally, or which might be avoided by adequate precautions.

* It may here be remarked that, with the exception of that grown at Vuelta de Abago and other favored localities, the tobacco of Cuba is of no better quality than that grown in Florida and other parts of the South. D. J. B.

The specific distinctions of this plant, as cultivated in America, do not appear important. The principal species, *Nicotiana tabacum*, is sufficiently variable and sufficiently capable of a wide adaptation to permit Cuban varieties to be immediately transferred to Ohio or New York; and there is probably no part of the continent in which tobacco has been, or may be grown, to which varieties from almost any other localities may not be directly taken. Several species are found on other parts of the continent as native, and the wild tobacco of the Pacific districts is used by the Indians, as that of the West Indies and Virginia was by the natives there at the discovery of America. In Persia, there is a native species; but most of the tobacco cultivated on the Eastern continent is from introduced American species. The existence, on remote parts of this continent, of native species of this genus, which strikingly resemble the best varieties in cultivation—as on the Missouri river; in Oregon, on the Columbia; in California, on the Colorado; and in New Mexico—sufficiently proves the almost universal adaptation of the plant to the temperature limits we have assigned. The species here discovered differ in so slight a degree as to bring them all decidedly within the list of luxuries, and to make their use as such common to the natives of the countries where they are found. For all that the extreme use of this article of luxury may ever require, there is ample space on this continent and the fullest adaptation in its climate.

The distinctions which may have some value in this connexion are those of districts in which climate and soil are alike favorable, and in which competing staples do not exist of so much prominence as to preclude attention to this. Maryland, Virginia, and Kentucky, will probably remain preferred districts for these reasons, though a large list of adjoining States might be added in case increased prices or exhaustion of soil should render it desirable.

As the distinctions in climate have reference to temperature mainly, at least on the side of limits towards the colder regions, and as these are very nearly accordant with those limiting the growth of Indian corn, it is unnecessary to give tabular statistics in this connexion. The measures of temperature for July, given at the commencement of this article, may be used, with the exceptions there indicated in regard to the temperatures of spring and autumn months. May to September, or from the middle of May to the 20th of September, is the average period required to be exempt from frosts, and this term of one hundred and twenty-five days is sufficient to mature not only this but many other products of American origin of the greatest liability to injury by frosts.

Statistics of temperature and of amount of rain would have little significance for the warmer regions. Texas and Cuba give the highest measures for particular months that are found on the continent, yet they do not seem particularly important, as such, to the cultivation of tobacco. No profusion of rain, as said before, appears important in that respect during the period of growth, or climatologically important. It will not illustrate any point, therefore, to distinguish districts in this manner. Whatever importance the amount or period of rains may have, appears only to refer to convenience of cultivation and curing, to which it is not proposed here to refer.

WHEAT CLIMATES.

The climatic range of wheat is greater than that of any other single staple whatever, in respect to some conditions. It differs so much from most others in its requirement of time, or the portion of the year occupied in its growth, that the temperature of the year, or of the seasons, is a less decisive test, practically, than would appear in a comparison of statistics for its several successful districts. Its flexibility, in respect to temperature, is very great on the side of high temperatures also in dry climates; and with both these points of direction in which it may extend its range, it becomes a cosmopolitan in cultivation, and goes almost everywhere through the temperate climates.

There are important limitations to its growth, however, in temperate climates, and many points on which its entire success depends are disclosed in an examination of the peculiar distribution of heat, humidity, and amount of rain throughout the year. It is very sensitive to certain extremes of this sort, and it is often very much restricted in actual cultivation by the risks arising from this irregularity alone.

The absolute temperature limits of the growth of wheat belong to the summer months, or to those in which it ripens; and for these months, they may be very precisely defined. The points of both the extremes are not far apart; and if absolute mean temperatures as recorded for the year could be employed, the district embraced would be very narrow. Before referring to actual districts of its growth, it may be well to give the apparent temperature limits of this ripening season.

In England, the summer of 1853 was, in many parts, of too low temperature to ripen wheat. The general deficiency of heat was from one-third to one-half less than usual. The temperature of July and August was two degrees below the average for those months, and 57° to 59° each. It is clear, from an examination of the temperatures for that climate, that a mean, for the ripening months, of 57° is insufficient to perfect the grain of wheat. As there are no American districts in which the temperature of other months is sufficient, and in which the heat of July falls so low as 57°, we cannot trace the line from these single months here. The temperatures are higher here as far northward as any grains may be grown, but for many parts of Europe this mean may be taken as a precise limit.

On the side of high temperatures, the United States give very good results from the experience of cultivation in various districts. At the extreme South, May is the ripening month, with a mean of 67° to 70°. In Virginia, June is embraced, and the temperatures are 63° to 65° for May, and 68° to 72° for June. Dividing the time in two months preceding the harvest, the means would be nearly 64° and 69° respectively.

In New York, at Rochester, the month of July is mainly included, and June and July are respectively 64° and 69°. In Illinois, the harvest closes in June, and the temperature of the last month is less than 70°; that of the one next preceding 60° to 62°.

From these comparisons, it may be seen that a temperature for the last month of the growth of wheat cannot exceed 70°, but falls rather below this limit. The recession of the ripening, as warmer climates are approached, to June, May, and even to April, as in Egypt, is suffi-

cient proof of the temperature limit in that direction. There are, therefore, but 13° of absolute range in this respect for all climates, and for the climates in which we find these higher limits probably but 9°, or from 60° to 69°. The equable temperature and uniform humidity of the English climate, give a lower point for the low temperature extreme; and with the same equable and humid character, the higher limit would probably fall some degrees short of that found in dry and variable climates. Ten degrees of difference may be assigned as the maximum range of temperature under which wheat will ripen in similar climates, and 13° as the range for all, as far as we may now compare them.

The sensitiveness of wheat in general cultivation to the various modified forms of temperature and humidity, is probably greater in the United States than in Europe. All conditions are so uniform in Western Europe, that low temperatures are more decidedly indicative of injury than other changes, and the variability of production is mainly on that side. It is variable from many purely climatological causes here; and if we may compare these with some precision among themselves and with Europe, some useful results may be attained.

The period, or portion of the year, required for the growth of wheat is a noticeable point. In England and parts of Europe the entire year is embraced, and the temperature and other conditions for every month must be taken into the account. In the south of Europe, two months of the last of summer are not included, and at the southern limit of this cultivation in the United States, two and a half and three months must be omitted. In all parts of the United States where wheat may be grown, at least one month, August, is not among those affecting it in any manner.

The next important point is its variability as to requiring the winter, or embracing its extreme months in its period; as in the United States, at least, a very large amount is grown requiring but one summer. The climatological difference is less, however, in this case than would appear probable, as the winter varieties will grow almost or quite to the northward limit of the summer varieties. The difference is merely one of varieties, also, and they may, by changing the time of sowing, be mutually transformed at any time. The apparent difference of climatic requirement singularly fails in the case, therefore, and the variability seems an adaptation to peculiar soils, rather than peculiar climates. For the greatest perfection of the grain, as well as for the districts of most successful cultivation of any variety, we have to consider the winter climate.

In a succeeding list, stations limiting the growth of wheat by too high temperatures are given. These are at the limits of success sufficient to repay attention to it, rather than those at which some variety would not grow, and they limit it both in the winter and summer temperatures. By a slight examination, however, it will be seen that temperature alone does not decide it, as Fort Graham, near the dry plains of Texas, is quite as favorable to the growth of wheat as Fort Smith, Arkansas, or Memphis. Upper Georgia and South Carolina, also, are more favorable at the same temperatures than coast or lower districts; the cause in these cases being evidently in the differences of humidity and amount of rain. In a more particular reference to the humidity of various districts, this point will be again referred to.

An element in the winter climate is also embraced, not measurable in temperature merely. The amount of snow and degree of surface protection are very important, as the United States furnishes many excellent winter climates for wheat where it has moderate measure of surface protection, which are entirely destructive without it, and of which the measures of winter temperature alone would therefore be a very imperfect guide. It may be sufficient, however, to say that in the small portion of our wheat districts at the extreme Northwest only, is the amount of winter precipitation so small as to leave the surface generally unprotected by snow at the critical periods; and even in these districts the devices of agriculturists in leaving some previous crop on the ground, or by protection in some other manner, may and do avoid much of the injury.

Of this winter climate another remark should be made—that it must suspend vegetation almost entirely; and it may, indeed, keep it wholly dormant for four or five months. There appears to be no important restriction in this case except on the side of too much growth, and the plant is preserved as perfectly when five and a half months under snow in Maine, as when but one month without growth in Georgia.

Even in the Northwest, on the open plains, it is evidently more the alternations of temperature than the absolute temperatures that destroy it on exposure, though we are deficient in observations of the point how far the air temperatures may fall, or what absolute temperatures would be destructive. But we find limits to its successful growth in the temperature of other parts of the year before these extremes are reached, except in the variability of extreme years, so that the more important limitations are expressed in monthly means, as usually observed.

First in the grouping of districts and comparison of their observed temperatures, those of the best districts of the United States may be given, and a few stations are sufficient to represent these. The first stations of the following table are selected for this purpose: Rochester, for the incomparable wheat district of Central New York; Gettysburg for those of Pennsylvania and Maryland; Cleveland for Northern Ohio and Michigan; and Milwaukie for Wisconsin and Northern Illinois. These are extraordinarily favorable wheat climates, and the winter temperatures require only the partial protection the snows of these districts afford. August is always out of the year for these districts.

The next list is at the northern limits of wheat cultivation on this portion of the continent. West of the Rocky mountains no station is found at the precise limits, though our northern boundary is there very near it. At Castine, Maine, the summer temperature, or that of the earlier months of summer, is the most decisive limitation. At Quebec, Fort Coulonge on the Ottawa river, Fort Brady, and Fort Ripley of Minnesota, limiting temperatures for some of the summer months exist, and perhaps at Fort Brady that of the highest summer month is too low. At Montreal, Fort Howard of Northern Wisconsin, and Fort Snelling, the risks of low extremes in the earlier months of summer are considerable. The stations given in this table limit cultivation quite as far westward as the sources of the Mississippi; but here the declivity of the general

surface northward gives a singular extension of the district in which it may be grown to some extent.

Sir J. Richardson* notices this district particularly, and, except the previously known wheat district of Lake Winnipeg, at Fort Garry, his observations and information are new.

As the temperature for the whole summer is higher at Fort Garry than at the sources of the Red river of the North and of the Mississippi, the successful growth of both wheat and Indian corn near Lake Winnipeg is not so decidedly anomalous. Wheat is there said to be of as good quality as in the average of the United States wheat districts, though it is a spring wheat, and does not incur the risks of winter temperatures.

Richardson remarks, that "wheat is raised with profit at Fort Liard, in latitude 60° 5′ north, longitude 122° 31′ west, and at an altitude of between 400 and 500 feet above the sea. This locality, however, being in the vicinity of the Rocky mountains, is subject to summer frosts, and the grain does not ripen perfectly every year, though in favorable seasons it gives a good return." This is on Mackenzie's river. "At Dunnegan, on Peace river, lying in latitude 56° 6′ north, longitude 117° 45′ west, and at an altitude of 778 feet, the culture of this grain is said to be equally precarious. It grows, however, freely on the banks of the Saskatchawan, except near Hudson's bay, where the summer temperature is too low. From Mr. McPherson, I learned that on the west side of the Rocky mountains good crops of wheat are raised with facility at Alexandria, on Frazer's river, in latitude 52° 30′ north, longitude 122° 40′ west, and 300 to 400 feet above the sea; also at Fort George, on the same river, more than a degree further north, and 100 feet higher.

"At Fort James, on the border of Stuart's lake, in latitude 54½° north, in a mountainous region near the source of Frazer's river, wheat continues to grow, but often suffers from the summer frosts. In these districts the grain comes to maturity in about four months. In the colony of Red river its growth is luxuriant, though the upper part of that country, which touches the 49th parallel of latitude, is elevated about 1,000 feet above the sea.

"At Fort Francis, situated on the banks of Rainy river, in latitude 48° 36′ north, longitude 93° 28′ west, wheat is generally sown about the first of May, and is reaped in the latter end of August, after an interval of about 120 days.

"On the island of Sitka, lying in 57° to 58° north latitude, though the forest, nourished by comparatively high mean temperatures and a very moist atmosphere, is equal to the richest woodlands of the Northern United States, yet wheat does not grow."

This extension of the district in which wheat may be grown with some degree of success is very remarkable; and though it does not attain any considerable importance as an agricultural or industrial pursuit, the possibilities of cultivation are highly interesting, as belonging to the climatology of this staple.

---

*Journal of a boat voyage through Rupert's Land; Arctic searching expedition; by Sir John Richardson—1851.

It must be observed, also, that the temperatures of the months from May to August preserve a singular uniformity over this great area. Thus, at Fort Ripley and the various stations about Lake Superior and the sources of the Mississippi, the mean temperature of May is 48° to 50°; that at Fort Garry, 52°; that of Cumberland House, 52°; that of Fort Chippewan, Lake Athabasca, 45½°; and that of Fort Simpson and Fort Liard, at 60° north latitude, in the valley of Mackenzie's river, 47°. For the remaining months of summer, the temperature is much the same as that of the stations given as the northern limit of wheat cultivation, in the table on the opposite page.

On both sides of this district, and from the longitude of the west side of Hudson's bay, eastward, as well as west of the Rocky mountains, the temperature of all the months of summer is too low, and every degree of this cultivation falls off to the limits elsewhere indicated.

There are a number of districts in the United States, also, in which *high* temperature and humidity together very much restrict or quite discourage wheat cultivation, and three stations are given as representatives of their temperatures: Cincinnati, New Harmony, (Indiana,) and St. Louis. Generally, this area embraces the district of the greatest amount of rain on the Western rivers—that of the Ohio, as far up as Portsmouth, Ohio, and including much of the southern half of both Indiana and Illinois. A large portion of Missouri, with some part of Iowa, is of this character; and still more of the States further south, near the Mississippi. In these districts there is change sometimes in the nutritive matter of the wheat itself, it would appear, as that of Southern Illinois and Indiana is often injurious to health—in the local designation, "sick wheat." That this is the result of peculiarities of climate is scarcely to be doubted, though no precise examination of wheat of this character is known to have been made. The difficulty of growing it, and its variable and imperfect character, in warm and humid climates, are well known, and it is undoubtedly to extreme conditions of this sort that this defective and half-poisonous grain of the south of Illinois is due.

In continuation of these general temperature comparisons, we can scarcely arrive at any important result for the interior and Pacific climates. With extremely variable temperatures there, the adaptation to wheat is almost always good; and Oregon, with a climate of English uniformity, or with high winter and low summer temperatures, as compared with the United States at the East, produces wheat no more bountifully than the heated valleys of the San Joaquin and Sacramento rivers of California. The valley of the Salt Lake and New Mexico are, equally with the Pacific districts, very favorable wheat climates; but it may be said of all these, that where the temperatures are not moderate the climate is very dry, and that, in this respect, the principal source of injury to this product in warm climates is quite avoided.

In these references to districts of high summer temperature, it must be observed that the period of growth is invariably limited to earlier months, where those of the midsummer are so warm. The measures previously indicated as belonging to the several months of growth and ripening, are not, so far as known of any of the interior or Pacific climates, altered in any considerable amount.

Mean temperatures of the wheat districts of the United States.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Rochester	26.9	26.5	36.2	47.1	59.0	66.7	72.1	69.2	61.7	50.1	40.5	29.7	47.4	69.3	50.8	27.4	48.7
Gettysburg	28.4	30.8	39.3	50.0	60.0	68.8	73.4	70.8	62.9	49.1	38.3	31.4	49.8	71.0	50.1	30.2	50.3
Cleveland	27.2	30.1	36.4	44.4	56.1	68.1	71.7	68.0	62.1	51.0	35.8	29.0	45.6	69.3	49.6	28.8	48.3
Milwaukie	25.2	29.4	34.8	40.7	51.3	64.8	69.8	67.5	61.2	50.7	38.5	23.5	42.3	67.3	50.1	26.0	46.4
Northern limits.																	
Castine	21.4	22.5	30.4	41.4	50.3	59.4	64.8	64.6	58.4	48.4	38.0	25.5	40.7	61.9	48.3	23.2	43.4
Quebec	9.8	12.8	24.3	38.6	52.8	63.7	66.8	65.5	56.2	44.1	31.5	17.3	38.6	65.3	43.9	13.3	40.3
Fort Coulonge	11.5	15.7	28.7	40.5	54.4	65.4	69.4	66.4	56.3	45.0	31.3	17.0	41.2	67.1	44.2	14.7	41.8
Fort Brady	17.4	17.0	25.7	38.5	49.5	59.4	65.1	63.2	53.9	43.6	32.7	21.3	37.9	62.6	43.4	18.5	40.6
Fort Ripley	8.6	13.7	25.7	36.2	49.7	61.9	66.9	64.7	57.1	43.1	30.7	6.6	37.2	64.5	43.6	9.6	38.7
Southern limits.																	
Norfolk	40.4	40.9	47.5	56.1	65.9	74.1	78.3	77.1	71.4	61.7	51.2	43.2	56.5	76.5	61.4	41.5	59.0
Camden	44.6	49.9	55.6	60.6	71.0	76.2	79.7	77.8	73.3	62.2	52.3	47.7	62.4	77.9	62.6	47.4	62.6
Sparta, Ga	42.5	51.2	54.9	65.7	71.9	81.6	82.8	81.8	74.9	61.4	56.7	43.4	64.1	82.1	64.3	45.7	64.1
Huntsville	42.0	42.6	51.3	61.3	67.2	74.2	76.4	76.2	70.1	59.5	49.7	41.8	59.9	75.6	59.8	42.1	59.7
Memphis	41.7	45.9	55.3	59.0	68.9	75.8	79.9	78.5	72.5	58.4	53.3	40.2	61.1	78.1	61.4	42.6	60.8
Fort Smith	41.6	44.8	50.2	63.1	69.1	75.7	79.6	78.1	72.1	60.3	49.7	40.0	60.8	77.8	60.7	42.1	60.2
Fort Graham	47.0	53.1	59.6	63.2	73.3	79.4	85.4	85.2	77.8	68.4	52.1	47.4	65.4	83.4	66.1	49.1	66.0
Cincinnati	33.0	36.7	45.1	51.1	63.3	71.8	78.6	75.5	66.4	55.1	44.6	34.1	53.2	75.3	55.4	34.7	54.7
New Harmony	34.1	41.2	52.5	56.0	67.6	76.3	78.8	75.5	65.6	55.7	43.3	37.6	58.7	76.9	54.9	37.6	57.0
St. Louis	33.2	34.9	44 3	59.0	66.3	73.8	78.4	76.3	68.1	54.9	40.0	33.8	56.5	76.2	54.4	34.0	55.6

PRINCIPAL EUROPEAN WHEAT DISTRICTS.

England, the northern plain of Germany, and the central areas of Russia—the last stretching eastward from Moscow to the Volga, at the boundary of European Russia, and southward from Moscow to the Black sea, with Wallachia and Lower Hungary west of this sea—may be designated as the chief wheat climates of Europe. In northern Italy a great amount of wheat is also grown, and this last district may properly represent the warmer climates of that continent on which it may be successful. For these great divisions, the climate is very various, especially in temperature. The British islands have singularly uniform and equable temperatures, rarely broken by non-periodic extremes of any considerable measure, or of any great severity. The east and north of England are better adapted to wheat-growing than the western counties and Ireland; and two stations, one in York and the other in Essex, are given, which represent the temperatures best adapted to this crop, as grown there. They are seen to have no analogies in the American climate, except on the North Pacific coast, and to be extremely unlike those of Central New York, Maryland, and Wisconsin.

In England, the summer growth reaches forward also to the first of September, and its whole period embraces the entire year. It also requires very nearly the full measure of summer heat for each month, and is seriously injured or destroyed by a diminution of two or three degrees on the mean of a month. The same measure of diminution would produce no injury in American wheat districts.

The Baltic wheat climates are next in the European list, and their temperatures very much resemble those of England. They have a more decidedly continental winter, and the spring and autumn are marked in the same manner. For winter, the temperature is about 10°

lower in the mean of the three months; for the spring, 6°; and for autumn, one or two degrees. The climate is less humid, also, than that of England, and somewhat more variable in non-periodic extremes; and its range of safe production, or liability to injury in extreme seasons from too low temperatures, is somewhat greater than that of the British islands. Failures in the Baltic wheat crops are more frequent and more disastrous than in England.

The interior districts of Russia constitute quite another distinct climate, of a continental character mainly, though not the highest measure for the Eastern continent. From Moscow to the eastern boundary of European Russia, the distribution of heat through the year is most nearly as in Wisconsin and Minnesota, of the United States. Little is known of the precise relations of temperature to cultivation of wheat in these districts, or what varieties are most successful. Whether the winter enters into the temperatures to be considered, is also uncertain. Single extremes of temperature are here very severe, but there is a considerable amount of winter rains, &c., and the country is generally well protected by snow. As far as definite information exists, this protection must be somewhat greater than in the same temperatures of the United States, and more uniformly preserved through the winter. For the summer months, the heat is greater here than in England and North Germany; for July, four or five degrees greater in the mean of the month. At Kasan, the eastern extremity of this wheat region, the mean of the winter is lower than in any district in which it may be grown on this continent, and an effective winter protection must necessarily exist there.

In South Russia and Hungary, embracing the plains west of the Black sea in Wallachia and Moldavia, another immense wheat district exists. The northern and elevated portions would differ little in climate from Moscow, and the central portions are correctly represented by Bucharest. From one to the other of these extreme points, the temperature changes are as those from Minnesota to Central New York—all parts being continental climates of different measures.

This district is also so near the limit of the heat necessary to successful cultivation as to be somewhat variable in the amount produced in different seasons. Further south, however, it merges into the dryer and warmer climate of the vicinity of the Mediterranean and Asia Minor, which still produce wheat largely, and in which Egypt may also be embraced. The changes and transitions, in passing through this range of districts, are far greater than in the United States, or on any part of the North American continent; and the great differences between Kasan, of Eastern Russia, and the valley of the Nile, show the temperature adaptation of wheat cultivation in a very striking light.

Generally, it may be considered sufficiently clear that temperature limits, as represented in the full record for the year, are not the most decisive in restricting the growth of wheat. Variable as its period is in the year, from a growth requiring every month, as in England, to one from December to April only, as in Egypt, it has a very great range in respect to the mean temperature for the summer and year. By reverting to the peculiarities of the climate of the United States in regard to amount of rain and to humid extremes, we shall find that its

southern border here is defined by these circumstances more decidedly than by temperature. On the Pacific coast, and in the climates of the interior, where so much rain and such extremes of humidity do not occur, wheat grows well when the highest temperatures prevail during many months. The valleys of California are almost or quite tropical in the actual measures of temperature for the summer months, yet the wheat there grown is of the best character, and the produce immense in amount for the surface covered.

These Southern Pacific districts are the Italy and Asia Minor of this continent, in these more important features of climatic adaptation, indeed; and are somewhat anomalous in many respects, in comparison with all other wheat climates, and especially with those of England and the Baltic.

Wheat climates of England and the Eastern Continent.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
York	33.4	39.0	42.9	48.2	57.0	61.2	62.4	63.5	57.2	47.8	40.8	36.4	49.4	62.4	48 6	36.3	49.1
Epping	36.9	39.4	43.2	48.9	56.6	60.0	62.2	60.9	57.4	50.0	42.9	40.8	49.2	61.0	50.1	39.0	49.8
Dantzic	27.4	30.8	35.2	43.4	52.1	59.3	63.6	62.9	56.1	47.0	38.0	31.8	43.5	61.9	47.1	30.0	45.6
Konigsberg	24.4	26.9	31.4	41.3	51.9	57.4	62 6	61.7	53.6	43.7	35.8	27.1	41.6	60.5	44.3	26.2	43.2
Berlin	27.7	31.6	38.1	47.5	56.5	63.4	65.8	64.4	58.4	49.9	39.3	34.9	47.4	64.5	49.2	31.4	48.1
Moscow	13.6	16.0	26.7	41.7	54.4	62.4	66.4	63.1	53.2	39.5	27.1	16.0	41.0	63.9	39.9	15.2	40.0
Tambow	12.3	17.5	27.4	42.4	55.5	63.9	67.5	63.8	52.8	41.0	28.1	17.1	41.8	65.0	40.6	16.0	40.8
Kasan	3.5	8.1	20.7	36.3	51.5	61.3	64 8	60.8	49.0	37.1	24.6	7.5	36.2	62.4	36.9	6.3	35.5
Bucharest	24.0	26.3	31.7	44.3	56.3	62.5	68.1	65.2	58 3	49.3	42.8	33.1	44.1	65.3	50.1	27.8	46.8
Alexandria	57.3	57.8	62.1	66.9	70.2	76.2	78.5	80.3	78.1	74.8	68.4	60.4	66.4	78.3	73.8	58.5	69.3

CLIMATOLOGY OF GRASSES IN THE UNITED STATES.

A brief sketch of some leading points in this branch of agricultural climatology is all that may be attempted here. It is, for many reasons, a very difficult branch of the subject, and one on which little general comparison has been attempted. The necessity for any distinctions of districts or of adaptation has not previously existed, and no considerable extension of the cultivation of this branch of the graminæ has been required, except in the occupation of the United States. In the portions of the country first occupied, the climate permitted transplanting English and European species to the extent then required.

For the greater portion of the continent, however, we must find new species and a new adaptation. Those of English origin at least cannot go into our plains and arid districts; and whether these districts develop any new forms of unusual value or of especial adaptation remains to be examined.

The principal climatological differences that control the growth of grasses are those of moisture and dryness—humidity and aridity, as conditions of the air alone through the year. The temperature and amount of rain are less important, singly, though a saturated and retentive soil may make amends for lack of atmospheric moisture. Such soils are, however, almost invariably associated with climates of considerable and uniform humidity, and the distinction practically amounts

to little, except as first mentioned, or that between wet and dry climates in the usual sense of the terms. There are many subordinate distinctions in the character of the soil, and special adaptations in this respect, independent of climatic peculiarities. A class of grasses will flourish only on arenaceous tracts, and even on perfectly naked sands of a moist climate, which would not grow at all on sandy tracts of arid climates. Grasses adapted to these soils, therefore, are peculiar in this respect, in a degree subordinate to their climatological peculiarity; and those valuable in the sandy districts of a northern coast, in Europe or America, will not be likely to prove as valuable in any interior.

As now cultivated, or as relied upon in their natural growths, there are two well-marked divisions of American and naturalized grasses belonging to the dry and humid climates, respectively, of the whole United States. There is another distinction in the temperature of moist climates, as the cultivated grasses do not go into the warmer portions of the country, however humid. The English grasses are the principal ones, and consist of the genera *Poa*, *Phleum*, *Festuca*, *Agrostis*, and *Dactylis;* and their most striking peculiarity is the uniform turf they form in growth. Most of these are very well adapted to the climate of the Northern and Eastern States, and of the North Pacific coast; and they here form the great reliance of cultivators. But they also approach their climatic limit here very nearly in both temperature and humidity, and prove their native position to be in a more equable climate. The winter of the upper parts of the New England States and of New York is sometimes destructive from low temperature alone, and the dry extremes are very injurious, and sometimes absolutely destructive. What precise measures of low temperature destroy these grasses it is difficult to say; but every alternate year affords some locality in which the cold is so great as to destroy the Timothy and orchard grasses. A continuance of cold for some days below zero of Fahrenheit, and with a minimum of 20° below zero, is undoubtedly certain to be fatal if the surface is exposed to the air, and is without protection by snow or otherwise.

There is apparently little difference in the hardiness of the principal cultivated grasses in resisting the temperature extremes. Low temperature alone may destroy them in all the elevated portions of the New England States and New York, and in Wisconsin and some parts of Illinois. In most cases the destruction of the three principal grasses occurs at the same time, and no singling out of particular species is remarked.

In the direction of high temperatures there appears no definite limit of this sort, or none depending on single extremes; but all these grasses fail when the mean temperature of the summer months attains to 80°. They have but a variable and uncertain success in Virginia, and in all the States South and Westward they are still less reliable, or fail altogether. As they are all perennial in the highest sense, the whole year and all its extremes must be taken into the account. They cannot, as in the Cereals, choose a portion of the year only, and adapt their requirement of time to the temperature. In this respect they differ most widely from a very important class of native grasses, which occupy the arid portions of the continent.

In further notice of the limitations of the European grasses, the humidity of climate must be considered. The dry extremes of many of the States where they may generally succeed are quite injurious or destructive in many cases, and this is especially true of the States at the West, where the soil is less tenacious and retentive than at the East. They fail to form the characteristic turf there, and are so much injured by those dry periods as to become displaced, or to decay gradually, if not suddenly, and to require frequent renewal. This departure from the native climate of these grasses is so great at the plains beyond the Mississippi as to require a wholly new class, and the European forms there cease, to re-appear only on the coast of the Pacific, in Oregon and Washington Territories, where the English climate is itself in some degree reproduced.

The northern or low temperature limits of these grasses appear nearly identical with those of wheat, and their liability to destruction by the cold of winter alone, without regard to the lifting of the plant from the soil, as is the case with wheat on tenacious soils, does not greatly differ. The grasses will perhaps endure a few degrees lower temperature.

The high temperature limits are nearly the same as with wheat also, taking the month of ripening for wheat as the highest temperature for any month of the year. The range of the English grasses is here little greater than that of wheat in this definition. As in cultivation, they succeed when the mean temperature for July is 75° to 78°, while the limit of wheat is little above 70° for the same month. In cultivation without unusual care they would not differ widely.

There is a possible limit also in low summer temperatures, especially if accompanied with a large amount of moisture in the soil and atmosphere. We are not able to give so precise limits for the English climate in this respect as for wheat, though the grasses we have received from them will not go many degrees lower than wheat for the ripening period—probably not lower than to 55° for the warmest month of summer, while the same limit for wheat is above 57°. In the United States, it may not go so low; though the question is practically unimportant, as we have no districts below 60° for July. In cold and wet localities of the Northern States, the difficulty of preserving these grasses is well known; and, as in other directions of limit, they fail gradually under measures of climatic disadvantage not absolutely destructive.

The contrasted class of grasses adapted to arid climates may advantageously be examined next, and these are all, or nearly all, natives of the interior and western portions of this continent, where they are required. Nutritious grasses of general range over the country of their origin are few in number, while those growing in particular localities, as in wet, or sheltered spots, or in others not representing the general surface, are quite numerous everywhere. The principal of the new American grasses is the buffalo grass, (*Sesleria dactyloides;*) the bunch grass, (*Festuca;*) and the several species of gramma grass, *Chondrosium*, or *Atheropogon*. The range of these is, for the last, or the gramma grass proper, as given by Captain Marcy in his Report on the survey of Red river, "bounded on the north by near the parallel of 36° north latitude, and on the east by the meridian of 98° west longitude. It extends

south and west indefinitely; but appears to flourish better in about the latitude of 33° than any other. As there is generally a drought on these prairies from about the first of May to the middle of August, it would appear that the particular varieties of grass growing here do not require much moisture to sustain them."

The buffalo grass, or small gramma, extends at least to latitude 40° in the same longitude, and the associated genera and species called "*muskeet*"* with these, cover the best portions of the valley of the Great Salt Lake, with the entire country south and west on which rains fall at any season. This whole family is extremely valuable, seeding profusely, and covering every portion of the country where sufficient rain for its growth may be found at any season. In the mountains a winter variety is found remaining fresh, while that of the plains and valleys is dried by the late summer heats. The whole class is admirably adapted to the requirement of the country, as they remain during the warmest months of summer, and until the rains of the next season come on, in a dried form, preserving the nutritive qualities throughout.

The precise time at which the heat and aridity check its growth, and convert it into dried hay, is not sufficiently known for the different districts. It is probably controlled more by absence of water in the soil, and want of rain, than by temperature—the heat being sufficient for this purpose when the water wholly fails.

Wislizenus, Emory, and Abert, met the smaller gramma, called the buffalo grass, at 38° north latitude, and by their references it might be inferred that this was the northern border at that degree of longitude. But Fremont found it at 40°, on the same meridian and 98° west longitude, and near the Platte or Nebraska river. It probably extends still further northward, and over much of this great plain to the Missouri. There are no satisfactory notices of the grasses of this great region; but the inference is reasonable that it should range nearly as far as subsistence is afforded to the immense herds of buffalo occupying that area. The recent surveys north of the Missouri were, however, unable to find any considerable amount of it; and Richardson was also unable to find the buffalo grass on the Saskatchawan, though at the time of his visit, recent fires had destroyed the growth of all kinds. He remarks a large intermixture of carices with the festuca, and other true grasses, on all the northern portions of the prairie region.

The new forms of valuable grasses found in this great range in our interior, deserve the greatest attention in reference to their introduction in field cultivation. The native species of the prairie region, east of the Mississippi, probably cannot be cultivated—they give way too easily at the approach of cultivation, and those of the dry prairies are rarely found in seed. The turf of this prairie growth is very strong and enduring; and in the native state, these are valuable grasses, well adapted to the intermediate climates in which they occur, where the

* The term *muskeet*, or *musquit*, is applied indiscriminately in Texas both to certain grasses and shrubs. Several dwarfy species of mimosa and acacia are called "muskeet trees." Some kinds of rich nutritious grasses, growing in tufts in that region, are called "muskeet grass." The true "musquit," (*Stipa spata,*) obtained from the banks of the Missouri, in 1804, by Lewis and Clarke, has been cultivated in Florida and Mississippi with the most favorable results. D. J. B.

humid and dry conditions pass into each other by gradual transition. These range over most of the country of the upper Missouri, as well as on the prairies eastward.

There is a large district in the United States deficient in adaptation to our present cultivated grasses, to which it may be possible to bring those of the interior ultimately. The prairie districts of the States bordering the Mississippi, and the principal portion of the Southern States, greatly need some better adaptations both to their soil and climate. The new grasses of the Southwest would probably not find a congenial climate in the Southern States because of the excess of rain and of atmospheric humidity; but for the drier portions of the States in the upper Mississippi valley, they may be found well suited. Some success has already attended efforts to introduce them.

They are perennials of as great endurance in the turf, apparently, as the English grasses, though they spread very slowly by the expansion of the root, and are reported to leave the centre of the concentric tufts in which they grow open, as by decay of the original root. But all the gramma and associated grasses produce seed largely, and under cultivation they might become all that could be desired as field grasses.

In California, valuable native grasses exist, in part of these and in part of other genera. There the climate is even more extreme in its contrasts, and some of the valuable grasses appear to be annuals. The bunch grass (*festuca*) is abundant on the upland slopes and valleys, and it is there, as everywhere, of great value. Whether this may be cultivated is more problematical than in case of the gramma, and there has probably been no attempt at it yet. In the lower plains and valleys, oat-grasses and annuals form a larger share; but whether they are exclusive occupants is not sufficiently known. There is certainly a tendency towards a less permanently perennial character in most of the grasses of the South and West, and they approach the higher graminaceous forms which constitute the grains, more nearly than those of northern origin, and the natives of humid climates.* The grains are, indeed, the product of the great continental interior of the Eastern continent, and belong to arid climates wholly in their original state. By analogy we might look for high graminaceous forms in the interior of this continent, but it is not known that any bread grain has had its origin in similar climates of this continent. Maize is one of the grasses or higher graminaceous plants, but this had a tropical origin, and it is, wherever grown, of a purely tropical type.

The grasses of the American interior are singular in all respects, and, so far as known, have no analogous forms in Asia. Too little is known, however, of the nutritious grasses of the interior of the Old World to institute a comparison of its forms found in arid climates with those produced here. It may be briefly referred to as a most desirable

* Bryant, in a work on California of some years since, says of the grasses of that country, "The varieties of grasses are greater than on the Atlantic side of the continent, and they are also far more nutritious. I have seen seven different kinds of clover," (not analogous to the true clovers,) "several of them in a dry state, depositing a seed upon the ground so abundant as to cover it, which is eaten by cattle, horses, and other animals, as corn and oats, when threshed, would be. All the grasses—and they cover the entire country—are heavily seeded, and when ripe are as fattening to stock as other grains."

point for investigation, however, and the continuance of the examination respecting climatic adaptation for the great interior area our agriculture should immediately embrace, is urged by the strongest consideration of both private and national economy.*

Little allusion has so far been made to the grasses fitted to the climate of the humid districts of the South. These have an essentially different requirement from either the arid regions of the interior and Southwest, or the debatable ground between these and the other extreme in the cool and humid climates of the North and East. From these last they of course differ still more widely. Experiment has very fully proved the impossibility of carrying the English and northern grasses under the excessive temperatures found in the Southern States. Both the temperature and humidity, or the joint effect of these, rather, precludes their growth entirely; though it is difficult to say whether either condition alone would so preclude it. Comparing the more humid climates of England with those of equally high saturation at the South, we might infer that temperature alone caused the difference, but positions in the States near the 39th parallel of latitude have temperatures in summer quite equal to those near the Gulf, and yet permit a considerable success in the growth of English grasses.

Agriculturists at the South have scarcely been successful in the attention hitherto given to the introduction of valuable grasses. Their cultivation is less a necessity of plantation management than of farm occupation, as at the North, and it only becomes imperatively such when the preservation of the soil from washing and exhaustion becomes necessary. Such is, at present, the state of much of the cultivated area at the South, and it is of the first importance to know whether the permanent grass covering of the soil may be attained by any possible means.

The normal range of the grasses, strictly speaking, is not so far south. Their native climates are north of the native grain districts, and in cooler and more humid atmospheres, while the southern part of the United States has a tropical summer, and lies on the opposite side of the climatological limit. We cannot anticipate success in grasses taken from the colder extreme in this opposite position, and probably very little for those adapted to dry climates, whether warm or cold. The source should be tropical or semi-tropical; and such has, indeed, been the origin of many species introduced and cultivated to some extent at the South. The Guinea grass (*Holcus polygamum*) is of this sort, and the Bermuda

---

* Fremont remarks of the value of these indigenous grasses, as found in his earlier expedition to the Great Basin and to Oregon: "The grazing capabilities of this region are great, and in the indigenous grasses an element of individual and national wealth may be found In fact, the valuable grasses begin within one hundred and fifty miles of the Missouri frontier, and extend to the Pacific ocean. East of the Rocky mountains, it is the short curly grass, on which the buffalo delight to feed, (whence its name of *buffalo grass*,) and which is still good when dry and apparently dead. West of the mountains it is a larger growth, in clusters, and hence called *bunch grass*. This has a second or fall growth. Plains and mountains both exhibit them; and I have seen good pasturage at an elevation of ten thousand feet. In this spontaneous product, the trading or travelling caravans can find subsistence for their animals; and in military operations any number of cavalry may be moved, and any number of cattle may be driven; and thus men and horses supported on long expeditions, and even in winter in the sheltered situations." (Report of Exploring Expedition, p. 277.)

grass, (*Digitaria dactylon.*) The last is much like the cane in its root and habit of growth, and both are purely tropical forms. The sugar-cane is itself frequently cultivated as a grass, with success; and all these are more easily cultivated as forage plants, to be used for pasturage and soiling only, than as dried in the form of hay. The succulent character of the growth scarcely permits curing, and the mixture of "winter grasses," or the coarser festucas often cultivated there for their winter's produce, of which the gramma grass and the technical "winter grass" are the principal, will ultimately be necessary to answer the end proposed in their grass cultivation, and indispensable, indeed, to their agricultural prosperity. The gramma grass of Texas and New Mexico may bear a considerable extension over the drier soils and least humid portions of the South, and it has already been introduced with some success.

These are substitutes for the true grasses, also, which may go into warmer climates than any grasses not of tropical origin. The trefoils—clover and lucerne—are important forage plants, not strictly grasses; and the lucerne is very well adapted to warm climates, at least in Europe. The clovers are nearly universal in their range; and as they add nothing to the climatic illustration respecting the grasses generally, they have not been alluded to. In some varieties, the clovers or trefoils will undoubtedly add to the resources of the warmer parts of the United States. The Chilian clover is new to the United States, and said to be successful to some extent. Leguminaceous plants also afford several species cultivated as forage plants in the South and West, or growing wild there. Several varieties of the wild pea are valuable in the native state, and many are cultivated. In California, a geranium (*Erodium cicutarium*) becomes a forage plant of great value; and several varieties, not precisely distinguished, have the general designation of "California clover."

These various substitutes will probably remain the principal reliance for our warmer climates; and among so many, it cannot be impossible to adapt some to both the winter and summer requirement of the South. The field occupation of their lands, in the interval of staple cultivation, by forage crops of some kind, is a most pressing need of Southern agriculture; and the selection from the list of plants capable of temporary or permanent occupation of the soil should be made without delay.

The grasses characteristic of arenaceous districts in the North and in Europe are very important in the economy of cultivation and in the reclamation of sea sands. In many localities on the North Atlantic coast they will be required to arrest the march of sand dunes, as in Holland, and on the English coast. But, as said before, their characteristic differences belong to soil rather than to climate; and, so far as known, the varieties used for that purpose would be of little value on the sandy plains of the interior. The gramma grass approaches nearest the qualities desirable there, and its distinctive adaptation is not to arenaceous soils merely nor mainly, but to the dry atmosphere and small amount of rain found in those districts.

In the present purpose, no illustration could be drawn from the experience of Europeans with arenaceous grasses, as there known. In the economical view alone, much may and should be done to introduce the species found valuable in Europe; and the attention of those most in-

terested has recently been turned to the subject, and results of great local importance may be anticipated. In some portions of Virginia an arenaceous grass is found to possess considerable value; and further attention to the varieties found so valuable on the coasts of Holland and England, as well as recently in Massachusetts, may develop a variety valuable on the sands of the interior.

COMPARISON OF THE LAST THREE YEARS IN THE RELATIONS OF CLIMATE TO AGRICULTURAL INTERESTS.

The following special comparisons for 1853 were prepared at the close of that year as a sketch of the more striking features of its agricultural climatology. With the mean quantities given in his comparison, other years may be examined in a similar manner, and an intelligible resumé of the more recent years, or those in which we have yet some interest and in fresh recollection, may be made in brief. The references to them are, for this reason, in a reverse order.

AGRICULTURAL RELATIONS OF THE SUMMER CLIMATE OF 1853.

The agricultural interests of the United States are more than elsewhere dependent on the peculiarities of any single year in regard to climate. If the area were no larger than that of European States generally, the consequences upon particular districts would be much worse than they now are, as any single product may be greatly injured or even wholly cut off over a small area. The principal staples range so far here, however, as to embrace districts of opposite character in any season's results, and losses in one portion may be balanced by unusual success in another, notwithstanding those losses are very severe where they happen to fall.

To distinguish and attach proper value to the real occurrences in any year, it is necessary to use the precise measures afforded by scientific observation. It is not difficult now to do this, and to apply current results of observation to actual consequences on agricultural prosperity. With the amount of valuable and precise observation of the several conditions of climate now accumulated through the meteorological systems, the relation of particular changes to actual results may be made clear and practically valuable, it is believed, and be brought into the service of the great economical and business interests depending upon agriculture.

In this purpose it has been attempted to distinguish the climatic peculiarities of the last three or four years, and to indicate their relation to agricultural prosperity in that period. For the year 1853, an unusually distinct character could be defined both here and in Europe, and the greater interest in its results has induced placing its examination first, and the elaboration of the points necessary to make a basis of comparison in that connexion.

The effort to accumulate and apply statistics in this purpose cannot at least be without some effect in directing attention to precise statements, and to the value of climatic observation. The observed mean temperatures, the extremes of temperature, and the amount of rain for

the growing months of the season, will be given, with such comparisons of them with the general mean as may be possible from observations previously made in the same locality. The measure of these differences which vegetation ultimately gives is really more precise than would be supposed, and it corresponds very nearly with the mean result of instrumental measurements.

With the usual supply of rain, the mean temperature of any month of the growing season is, in our climate, a very direct measure of its comparative productiveness. Single extremes of temperature are less important unless they reach a frost, and in any case they are easily defined, and the precise degree of their importance may be promptly stated. In England a greater uniformity exists in temperature; yet a depression to the minimum of the monthly mean for any month of the growing season there never fails to cause great injury, and is often disastrous to important staples. We have here a more elastic class of staples, or a greater margin over which they may be forced without severe losses; and we have also a far greater range in all the conditions of climate, and especially in temperature and humidity. Our growths are probably much more irregular and variable than those of any part of Europe, and our extreme losses only injure us less from the elasticity of our economical interests and the range of our staples into districts so widely separated that the effects of the climate of any year are never uniform over the whole.

The first three months of the year are scarcely included in the present purpose. Unless distinguished by unusual severity of some feature of climate, they have little influence on cultivation, and only a partial control over any of its interests. For the year 1853, none of the first three months had any extraordinary character; they were generally somewhat above the mean temperature, and with few extremes of cold. In March the rains were heavy at the South; otherwise the precipitation, or entire amount of water falling in rain and snow, for the three months, was of the usual quantity, and quite equally distributed.

In April there was a somewhat injurious drought in Maine; the usual amount of rain in Vermont, the interior of New York, and on the Atlantic coast as far south as North Carolina. A district embracing most of the remaining part of New England, and the more elevated portions of the States southward to Alabama, had a large excess of rain; and most of the Western States had a similar excess, particularly Michigan, Wisconsin, and Iowa. In the extreme South, there was very little rain; in parts of Florida and Georgia, none during the month.

In May, it continued excessively dry at the South in the same districts affected in April, with a slight exception just on the Atlantic coast. The distribution was much the same northward, but with some excess in Lower Virginia, and in Eastern Pennsylvania and New Jersey. In all the Northeastern States the rains were very heavy in May, usually twice the average amount. In Michigan, Wisconsin, and adjacent parts of Indiana, Illinois, and Iowa, the amount was even more excessive than in April—the States south, in the Mississippi valley, having a little less than the usual amount.

The effect of this distribution for the two months most important to

the planting States was extensively injurious. At the North, April scarcely enters into the list of months affecting cultivation, and the profusion of rain was favorable to all that could be affected at that time, as it was attended with unusually high temperature in New York and in the New England States. The absence of rain in some parts of Maine in April, was the only unfavorable event in the general and early advancement of vegetation at the Northeast through both months.

In the Northwestern States, the temperature of April was but slightly higher than usual, and vegetation little beyond its usual stage of advancement. In Kentucky and Tennessee, it was more decidedly warmer, being from three to five degrees above the mean temperature, and, with the considerable fall of rain, unusually favorable.

May was usually colder than the mean at the South, though its mean was not so low as the effects of the month on vegetation might seem to show. There were several extremes of cold, and these in connexion with rains also, which were quite unfavorable at the West in this month; and in the States of Alabama, Georgia, and eastward, the drought was very severe. The effect of the absence of rain in any considerable quantity in a large area here, from March to some time in June, was generally injurious, and in many instances quite destructive to whatever was capable of injury at the time. The most unfavorable cold weather was in Kentucky and Tennessee, where frosts occurred several times. There were slight frosts in Lower Virginia and North Carolina, also, on the 14th and 15th.

In Central Pennsylvania and Western New York, the usual changeable character of the month was experienced, with a favorable preponderance in most respects. In the New England States the temperature was higher, the amount of rain greater, and the season more advanced than elsewhere. The rains were uniformly distributed and abundant in these States, and the number and severity of frosts not greater than in Kentucky and Tennessee. All vegetable growths were brought forth rapidly, and were much in advance of those of the same latitude at the West. The mean temperature of May in Vermont, New Hampshire, and adjacent parts of other States, was from two to five degrees above the general mean.

In Ohio, the mean temperature was slightly greater than usual, and the seasons not unfavorable; but further west, in Illinois and Iowa, the mean for the month was two to four degrees below the average, and, with the frequent frosts and some severe and cold rains, vegetation was generally retarded.

The mean amount of rain for April and May for a series of years, may be given here in a tabular form, at several stations, for comparison with the general tables for the present year, at the close. The readier verification of the detailed statements just given, may be had by giving the general means a place here.

Mean annual amount of rain for April and May.

	April.	May
	Inches.	*Inches*
Gardiner, Maine, 16 years	3.3	4.1
Hanover, New Hampshire, 18 years	3.1	3 8
Burlington, Vermont, 18 years	1.9	3 4
Amherst, Massachusetts, 17 years	2.9	3 8
New Bedford, 40 years	3.5	3 6
Providence, 21 years	3.4	4
Erasmus Hall, Long Island, New York, 34 years	3.5	3.8
Albany, 27 years	3.1	3.8
Utica, 20 years	3.2	3.2
Rochester, 20 years	1.9	3 2
Philadelphia, 28 years	3.3	3.4
Baltimore, 16 years	3.3	3 3
Washington, 16 years	3.0	3.3
Norfolk, 16 years	3.0	3.8
Charleston, 7 years	2.2	4.3
Savannah, 13 years	2.1	5.8
Key West, 14 years	1.1	3.1
Mobile, 10 years	4.4	4.3
Huntsville, Alabama, 12 years	5.0	4.0
New Orleans, 13 years	4.1	3.4
Matamoras, 3 years	0.6	2.4
Fort Gibson, 16 years	4.3	4.3
Nashville, 7 years	4.4	4.7
Louisville, 11 years	3.5	4.2
Cincinnati, 13 years	3.8	3.4
Marietta, 25 years	3.0	3.8
Detroit, 9 years	2.8	2.3
St. Louis, 16 years	4.0	4.6
Athens, Illinois, 10 years	4.9	4.4
Muscatine, Iowa, 8 years	3.6	5.2
Milwaukie, 7 years	2.4	2.5
Mackinac, 8 years	1.2	2.0
Fort Snelling, 15 years	2.3	3.2
Fort Leavenworth, 16 years	3.6	3.9

It will be seen from this table, that April has generally less rain than May, though not uniformly. The interior at the North has less rain in April; but at the South, as Mobile, Huntsville, and New Orleans, usually more. On the Atlantic slope, from Baltimore to Maine, the amounts are strikingly equal.

In temperature, a basis of comparison, by which the statements may be followed through, may be given in a list of mean temperatures for April, which is usually near the annual mean, and in a statement of monthly differences of successive months to September.

Thus the mean temperature of April for forty years at Castine, Maine, is 41°.4; the mean of May is 8°.9 above that for April; June 9°.1 above May; July 5°.4 above June; August 0°.2 *below* July; and September 6°.2 below August.

Mean absolute and comparative temperatures of the summer months.

	April.	May.	June.	July.	August.	Sept.	Year.
	°	°	°	°	°	°	°
Castine, Maine, 40 years	41.4	8.9	9.1	5.4	—1.2	—6.2	43.6
Portsmouth, N. H., 17 years.	42.4	9.7	9.3	5.3	—1.6	—6.1	45.2
Burlington, Vt., 18 years	42.0	12.9	9.6	4.6	—1.2	—8.6	44.8
Salem, Mass., 43 years	46.0	10.8	10.7	5.3	—2.0	—7.6	46.9
Boston, Mass., 26 years	46.3	10.8	9.8	5.4	—2.2	—7.2	48.8
New Bedford, Mass., 41 y'rs.	44.6	9.8	9.5	5.6	—1.2	—6.4	48.4
Providence, R. I., 21 years	44.7	9.8	9.8	7.4	—6.1	—8.1	48.1
New York, 30 years	49.1	10.5	9.5	5.8	—1.6	—7.4	51.9
Albany, 22 years	47.6	12.1	8.3	5.2	—2.0	—8.8	48.3
Rochester, 18 years	45.8	10.4	8.2	4.6	—3.0	—7.2	46.9
Toronto, 13 years	41.4	10.3	9.3	5.3	—0.7	—8.3	44.2
Philadelphia, 63 years	51.1	11.8	8.5	4.7	—2.8	—6.5	52.0
Baltimore, 22 years	52.9	10.3	8.4	5.0	—2.0	—6.8	54.4
Norfolk, 25 years	56.1	9.8	8.2	4.2	—1.2	—4.7	59.0
Charleston, 20 years	64.9	7.9	5.8	2.3	—1.0	—4.2	66.0
Key West, 9 years	76.3	4.0	2.9	1.2	0.3	—1.0	77.1
Mobile, 10 years	67.1	7.0	3.8	2.0	—0.4	—3.3	66.5
New Orleans, 18 years	67.6	6.4	5.4	1.8	—0.8	—2.5	67.5
Fort Gibson, 25 years	62.6	7.1	6.3	4.3	—0.2	—6.8	60.8
St. Louis, 16 years	59.0	7.3	7.5	4.6	—2.1	—8.2	55.6
Cincinnati, 18 years	54.5	9.0	7.6	5.1	—2.5	—8.2	53.7
Marietta, 24 years	53.0	8.7	7.4	3.5	—1.8	—7.4	52.4
Fort Gratiot, 17 years	44.4	9.4	9.8	5.8	—2.0	—7.1	46.4
Green Bay, 23 years	42.9	14.8	8.8	4.8	—3.4	10.8	44.9
Fort Snelling, 30 years	46.4	12.6	9.0	5.5	—3.7	—11.0	44.6
Sault St. Marie, 21 years	38.5	11.0	10.0	5.7	—2.0	—9.3	40.6

The relation of the several months affecting vegetable growths to each other in mean temperature may be readily seen by this table for most parts of the United States. It is intended only to give such data as are important in the present case, however, and the more distant States and stations are therefore not included.

April is seen to be below the mean temperature for the year by an average of two degrees, except in the West; where, as at St. Louis and Fort Gibson, it is as much above the annual mean. May and June increase in temperature equally in the Northern States, and each is nearly 10 degrees above the preceding month; but at the South this difference is much less and least for June. The average difference from July to June is half the previous differences very uniformly—decreasing from the north southward, from five degrees in Maine to one degree at Key West.

August differs from July very slightly—from three and a half degrees as the maximum in the Northwest, to nothing in the extreme South. September is 10 degrees colder than August in the Northwest, and 6 to 8 degrees in other parts of the North; falling off to a difference at New Orleans of two and a half degrees, and of one degree only at Key West.

The basis for comparison here given may be made available by any one possessing observations for the present year, whatever difference in absolute temperature may exist between his station and the stations in the table, by selecting the nearest as the proper representative of the curve of monthly differences at his locality.

In June the extremes of every sort were equally great, though not, as in May, of an opposite character in different parts of the United States. It was characterized by excessive heat and severe droughts almost everywhere, to the last of which extremes the only exception was in Wisconsin and Iowa. In these States only the rain was profuse, and somewhat greater than the normal mean. The almost universal deficiency of rain for this month has scarcely been equalled, and the partial exceptions, or mitigations rather, in addition to that just mentioned, were in Lower Florida, some parts of Virginia, and of Northern Ohio and Eastern New York, with Western Massachusetts. The vicinity of New York city was the only decided exception east of Wisconsin.

The temperature of June was uniformly very high, reaching the highest point of eight and nine degrees above the normal mean in the Western States, and it was generally equal to that for July, while the mean summer curve places it three to four and a half degrees less.

The continuation of the long drought in Georgia and parts of adjacen States, which began at the close of March, was complete to the last of June, and the general expression of those interested in agricultural affairs there was, that the failure of important staples would be extensive. The same extreme absence of rain produced decidedly unfavorable effects in Massachusetts and portions of adjacent States, and the close of the month was a period of most extraordinary heat in the central parts of the United States, without sufficient rain to relieve vegetation, except in the vicinity of New York city. At the South, however, the rains became abundant, and even excessive, in the districts of severe drought up to that time. In the planting States east of the Mississippi they began near the first of the month, and were continued and profuse throughout, giving as the amount of water falling, from seven to eleven inches, or nearly twice the mean depth. At New Orleans, and at Cedar Keys, Florida, the amount was eleven and a half inches. Some of these flooding rains were locally injurious, but such injuries were confined to the overflow of river bottoms, and the usual destruction from thunder storms of limited extent. The mean temperature of the month was very near the general mean, and only equal to that of June at the South, except immediately on the Gulf coast.

For the planting States the character of the month may be briefly summed up as extraordinarily favorable, and as going far to neutralize the greatly unfavorable character of the preceding months.

In Tennessee and the States west, and in all districts in this latitude, the rains were near the usual amount and well distributed through the month. In Central Illinois there was some deficiency; but further north, in Iowa and Wisconsin, an excess, reaching to near double the usual amount. In Michigan, Eastern Ohio and Western Pennsylvania, and New York, there were severe droughts through the entire month and continuing into August. Portions of Central and Eastern Ohio, and of Pennsylvania, suffered most in this month, and the effect was disastrous on some products, and especially on the grazing interests. West of Harrisburg, Pennsylvania, with some exceptions of violent showers in limited districts, the rains for the month were very small; and the same conditions prevailed in Central and Western New York, while the eastern portions of both States had profuse rains nearly throughout.

In the New England States there was no exception to the general sufficiency and equal distribution of rain and snow, and the temperature was rather above than below the mean—in Maine, decidedly above the general mean. In some parts of the country the month appeared colder than usual by the contrast with June,* but it was not so in reality by the best comparisons we are able to make with well-determined mean quantities.

August in most parts of the United States was equal in temperature to July, and warmer than usual by the normal difference between these months, which difference varies from two to three degrees in the Northern States and disappears gradually toward the Gulf coast. The early part of this month was excessively warm everywhere, but the latter portion had a singular extreme of cold, resulting in frosts in portions of Michigan, Wisconsin, Northern Iowa, Illinois, and Indiana. Some decided injury was done to the crops in parts of the first mentioned States—more conspicuous, however, from its rarity, than important in amount.

The distribution of rain for August was very unequal in the various parts of the country, and also through the month at any locality. The dry period, already so severe in Western New York, continued through much of the month in some elevated districts, and in some parts of Michigan, Ohio, and Pennsylvania. In the East, and about New York city, the rains were excessive—the district of greatest excess, from Lower New Hampshire to Northern New Jersey, varying from seven to twelve inches in depth of water fallen. At the South the amount of rain was not far from the average, and very well distributed through the month. Some portions of Georgia were deficient, and there was more than the usual amount in South Carolina.

The unfavorable points of the month were, some damage from excess of rain at the East; some prolongations of the drought in the grazing districts of New York, and slight injury at the West from frost and absence of rain.

September was above the normal mean temperature in all parts of the United States to the amount of two or three degrees in some parts of the West, and one to two degrees over the entire North and East. Its character in this respect was favorable, though cold extremes of temperature become very important to some descriptions of cultivation in this month, and some notice of its frosts is required to complete this statement.

The first frost in Maine and New Hampshire occurred on the 12th, the second on the 25th; the last of which was the decided check of vegetation. In Vermont, at Burlington, and in the eastern parts of Massachusetts, the first frosts were on the 25th, and variably on the 30th. In New Jersey the first frosts were also on the 30th, and in most parts of Pennsylvania at the same time, though elevated districts had light frosts on the 12th. In Maryland and the mountain valleys of Virginia there were frosts destroying vegetation on the 30th, but no

* At Cincinnati Mr. Lea reports it "the coldest but two in ten years;" but the mean he gives is but 1.5° below his own general mean, and very nearly equal to that given by Professor Ray for eighteen years.

injury was done on the low plain of Virginia nor southward, though slight frost appeared in some places.

In the hilly parts of Southern Ohio there was light frost on the 28th, and on the lake shore at the North.

In Michigan there were light frosts on the 10th, with "killing frosts" on the 23d, 25th, and 28th.

In Central Indiana the first frosts were on the 20th and 23d, and the same in Central Illinois. In some parts of Iowa and Wisconsin the first severe frosts were on the 31st, though the most elevated places had frosts on the 8th.

September is less important than other months in the influence of its amount of rain on producing interests. The amount was again very large at the East and in the South, amounting to fifteen inches at Cedar Keys and Pensacola, and to ten inches from Jacksonville to Charleston. Some damage was done by these rains in retarding the development of the cotton boll and by flooding low lands. From the most important localities in the southward which might be influenced in this manner our information is meagre, and it is only known that some complaint is made of this result generally by Southern observers. In parts of the Northwest, and especially in Michigan, it continued dry.

Of the remaining portion of the season affecting vegetation it is only necessary to give the extremes which close it up at the South. The mean temperature of October is comparatively unimportant, except to semi-tropical cultivation, and to the grazing interests of particular States. The extremes which bring the "killing frosts" are, however, peculiarly important in American seasons, and to distinctively American staples. A brief notice of this point is sufficient here, from the signal character of this "killing frost" in the present year to the farthest point southward the phenomenon ever extends.

At Charleston, South Carolina, there was killing frost on October 21st, and universally over the entire South on the morning of the 25th. This was probably the first damage to the cotton-planting interests anywhere, though in the uplands of several States there were frosts as early as the 14th.

The retarded cotton crop no doubt suffered much injury at the last. The rains of September and the generally wet character of the latter parts of the season, together added a considerable item to the first cause of failure in the early droughts.

Some injury was done by frosts early in October to the tobacco crop of Virginia, but to this staple the season was generally favorable.

The whole summer of 1853 was much warmer than usual on this continent. At all places in the central and northern portions of the United States the mean temperature for the six months was two degrees above the mean, determined by series of observations of from twenty to forty years, and the uniformity of this measure there is remarkable through all the comparisons. At the South this difference fell off gradually to less than one degree on the Gulf coast.

To give the fullest value to these comparisons, a clear limitation should be made of the districts having peculiar climatic adaptation to the several staples of agricultural production. To do this satisfactorily, however, requires more of time and space than can be here devoted to

it. It is also apart from the direct purpose in this statement, which is to define climatic conditions mainly, and to give so much only of the incidents and effects as will permit ready application of the data to such purposes. The limit of certain staples is, nevertheless, essentially climatic, and the definition of the cotton, sugar, hemp, and wine-producing districts may be referred to as far as these are now determined.

It is difficult to give a summary, in a single statement, of the resulting character of the producing season for the whole country. It may be said, however, that the cotton-growing districts were generally unfortunate in all their staples, though the cane and the cotton of the extreme Southwest scarcely shared in these disadvantages. The grazing districts of some portions of the Northern States also suffered heavy losses. These, if not all, are the most considerable enumerations of injurious results from the extraordinary conditions of a summer usually favorable to most agricultural interests, and especially so to the grain production of the Central and Northern States.

A brief comparison with the character of the summer in England and in Europe may be given in conclusion. An English statement, brought down to the close of September, gives the following differences for each month from the mean of the same month for twenty-seven years at London. The same comparison is given for Philadelphia, Marietta, Ohio, and New Orleans. The signs indicate the excess or deficiency of mean temperature in degrees and tenths.

Temperatures of 1853 *compared with constant means.*

	London, 27 years.	Philadelphia, 60 years.	Marietta, O., 24 years.	New Orleans, 18 years.
	°	°	°	°
January	+1.8	−1.8	−1.6	−4.7
February	−6.8	+0.4	−0.4	+1.8
March	−5.0	+1.0	−1.3	+0.7
April	−1.8	+2.0	+1.7	+1.2
May	−2.7	+3.6	+2.0	−1.1
June	−1.4	+3.1	+6.9	+1.8
July	−1.3	+0.2	+0.4	−0.2
August	−2.4	+2.7	+3.1	+0.0
September	−1.6	+1.8	+0.8	−2.2
Mean of 6 mos., April to Sept.	−1.87	+2.28	+2.48	+0.50

Thus, for the growing months of the year, the temperature was uniformly below the mean in England, and by an average of nearly two degrees. By a comparison with the destructive season of 1816, the present year is shown to have approached nearer to the low temperature of that year than any other in this century. June and July only were warmer than in that year, by from one to two degrees each. The summer of 1816 was also colder in the United States than any other in the records of temperature, which are quite complete from 1740. The result of the present summer on the agricultural interests

of Great Britain cannot fail to prove disastrous, and to demand all the surplus of our own production.

On the continent of Europe, the summer of 1853 was also much below the mean temperature to the close of June; but in July and August it rose one to two degrees above the mean of a series of years. No decisive statements have yet reached us; but Western Europe undoubtedly has much resemblance to England in the effect on agricultural production, as it has in the observed temperature.

The stations that follow are selected in such a manner as to represent the several States and districts intelligibly with as small a number as possible. From two to three hundred returns, more or less complete through the various months, are received for every year, exclusive of the military posts, which number eighty or ninety; and this very large, and also very accurate and reliable system of observation, constitutes an effective force for these more immediate and practical determinations, as well for those of a remote and purely scientific character, without, as it is believed, an equal in co-operative research on the laws and effects of climate.

Depth of rain falling at various stations in the United States, from April to September, 1853, *in inches and tenths.*

	April.	May.	June.	July.	August.	Sept.
Albion Mines, Nova Scotia	1.8	2.9	3.1	2.9	4.1	------
Montreal	3.6	6.4	3.1	3.1	7.0	10.1
Eastport, Maine	1.9	3.3	0.3	1.7	4.9	------
Bucksport, do	0.8	6.4	0.0	3.4	--------	------
Biddeford, do	1.8	5.1	0.6	1.8	3.3	4.9
Fryeburg, do	0.8	6.5	0.8	1.5	3.1	6.7
Londonderry, New Hampshire	3.2	5.8	1.2	2.9	6.8	4.3
Concord, do	3.1	6.4	1.3	4.0	4.8	5.4
Manchester, do	3.0	6.3	1.0	1.9	9.1	4.9
St. Johnsbury, Vermont	2.3	7.6	1.8	3.1	--------	------
Burlington do	2.2	3.9	1.7	3.1	3.4	5.7
Worcester, Massachusetts	4.9	5.4	1.0	3.2	10.7	5.3
Amherst, do	3.4	5.4	2.6	3.5	6.1	5.7
Newburyport, do	3.1	6.2	0.6	1.7	6.9	3.5
N. Attleboro, do	5.0	6.3	1.8	3.5	8.8	4.3
Barnstable, do	7.0	7.1	2.0	3.5	2.4	5.3
Elmwood, do	4.0	7.3	2.3	4.0	10.2	------
Southwick, do	3.5	4.7	1.6	5.3	8.5	6.2
New Bedford, do	3.5	3.9	0.8	3.5	2.6	3.4
Pomfret, Connecticut	4.3	4.5	1.4	3.8	6.8	3.9
Fort Hamilton, New York	4.8	6.0	4.4	5.8	5.5	3.7
Fort Columbus, do	3.3	5.8	4.8	4.4	5.2	5.5
West Point, do	5.8	8.0	3.7	10.4	7.8	3.5
Madrid, do	1.9	5.3	0.9	1.7	3.9	------
Gouverneur do	4.0	2.0	1.6	0.8	--------	6.7
Lodi, do	3.2	3.0	2.2	0.7	4.7	5.4
Buffalo, do	--------	2.4	1.0	--------	2.1	4.0
Newark, New Jersey	3.0	4.7	3.6	3.2	--------	------
Bloomfield do	3.0	4.6	2.7	3.6	12.1	4.3
Ceres Pennsylvania	4.4	3.7	--------	--------	--------	2.3
Moss Grove do	3.7	3.1	2.5	0 7	3.1	2.1
Indiana, do	5.7	4.7	--------	--------	--------	------
Hollidaysburg, do	4.0	3.6	1.0	1.1	5.0	1.8

TABLE OF RAIN—Continued.

	April.	May.	June.	July.	August.	Sept.
Pittsburg, Pennsylvania	3.6	4.3	1.8	3.4	7.7	2.4
Bedford, do	2.5	0.9	0.3	1.5	2.3	------
Gettysburg, do	4.5	3.6	0.2	5.6	3.3	3.9
Norristown, do	4.0	6.0	1.5	4.8	5.0	2.9
Morrisville, do	4.1	5.1	3.2	7.0	4.6	5.4
Harrisburg, do	3.2	5.0	0.5	3.6	2.8	2.3
Lima, do	3.6	5.5	1.0	6.8	2.9	4.3
Philadelphia do	3.8	5.2	1.0	6.2	3.0	4.4
Baltimore, Maryland	3.3	4.4	0.1	2.4	4.7	3.3
Schellman Hall, do	5.2	3.1	------	2.6	6.6	4.1
Frederick, do	5.2	4.5	0.3	4.1	4.0	3.3
Baltimore, do	3.7	5.4	0.7	3.5	3.5	4.1
Smithsonian Institution, Washington	3.5	3.9	2.3	5.3	4.5	3.6
Alexandria, Virginia	3.4	5.3	2.8	5.1	5.9	3.5
Richmond, do	2.5	2.3	2.7	4.7	2.7	------
Lewisburg, do	3.7	2.6	2.3	4.4	2.4	4.6
Buffalo, do	4.4	3.0	0.6	3.8	2.7	------
Brunswick co., do	5.1	1.8	2.6	5.8	4.0	3.2
Portsmouth, do	5.4	5.8	0.3	------	------	------
Fort Monroe, do	2.5	2.1	0.5	5.8	1.9	1.1
Camden, South Carolina	1.0	0.5	3.3	7.1	5.7	6.2
Fort Moultrie, do	1.1	2.5	1.5	10.9	2.2	8.1
Savannah, Georgia	0.4	3.9	0.7	6.4	8.1	9.4
Sparta, do	0.6	0.8	0.7	5.3	2.7	------
Whitemarsh Island, Georgia	0.4	2.5	1.2	5.2	5.5	13.2
Penfield, do	------	------	0.2	3.7	1.9	5.3
Culloden, do	1.8	0.7	0.3	9.8	1.1	5.4
Perry, do	0.6	0.5	------	------	------	------
Jacksonville, Florida	0.4	1.5	3.2	7.4	2.7	9.7
Key West, do	0.0	0.9	18.1	2.3	5.0	------
Cedar Keys, do	0.0	1.5	3.2	11.4	3.6	15.4
Knox Hill, do	0.1	1.9	3.4	7.5	------	5.1
Tallahassee, do	0.0	0.2	2.8	7.9	4.6	8.0
Pensacola, do	0.5	0.2	1.2	2.5	1.5	14.7
Eutaw, Alabama	------	1.9	0.7	8.9	5.8	------
Monroeville, do	------	------	------	------	------	9.6
New Orleans, Louisiana	1.8	3.8	1.7	11.5	6.3	4.9
Fort Graham, Texas	2.0	3.3	2.0	2.1	0.3	------
Austin, do	*m.	pro.	pro.	pro.	pro.	pro.
New Wied, do	m.	sm.	pro.	pro.	pro.	m.
Fort Towson, Cherokee Nation	5.0	9.1	0.9	5.4	0.5	6.1
Lebanon, Tennessee	4.2	3.5	1.0	4.9	------	------
Glenwood, do	4.0	4.4	0.9	3.6	4.5	4.1
Knoxville, do	5.5	3.9	1.4	------	------	------
Danville, Kentucky	4.5	2.6	0.3	------	3.4	5.0
Louisville, do	4.7	1.9	0.7	4.8	4.0	3.2
Cincinnati, Ohio	7.7	2.2	1.9	4.8	------	3.9
Granville, do	3.9	2.6	1.3	------	4.0	3.9
Marietta, do	5.6	2.6	0.6	3.7	1.3	2 3
Cleveland, do	1.5	1.9	3.4	------	------	------
Oberlin, do	3.9	3.9	2.1	3.7	4.7	4.6
Detroit, Michigan	5.9	7.9	2.5	2.3	3.6	2.
Ann Arbor, do	5.0	5.9	0.7	1.1	3.9	1.4
Brooklyn, do	5.0	7.0	1.5	1.7	------	------
Battle Cr'k, do	4.1	5.7	1.6	1.5	1.0	4.

* The amount at some important and remote stations is vaguely given as *profuse*, *medium* or *small*.

TABLE OF RAIN—Continued.

	April.	May.	June.	July.	August.	Sept.
Richmond, Indiana	3.1	2.1	1.2	3.0	5.3	5.0
New Harmony, do	pro.	m.	1 2	2.4	.....	5.5
Ottowa, Illinois	pro.	pro.	pro.	m.	m.	m.
Augusta, do	pro.	v. pro.	pro.	sm.	sm.	m.
Athens, do	2.5	6.7	5.5	3.8	3.6	3.4
Alton, do	m.	3.5	1.5	3.1	2.3	0.1
Hannibal, Missouri	pro.	m.	pro.	m.	pro.	1.2
Fort Leavenworth, Mo.	2.4	3.4	5.9	3.2	5.0	1.4
Fort Madison, Iowa	9.2	3.1	7.6	3.8	5.0	2.9
Muscatine, do	11.8	4.6	6.4	6.6	1.7	.....
Bowen's Prairie, do	pro.	.....	m.	6.6	0.7	1.0
Poultney, do	4.8	5.7	3.3	6.3	0.5	2.9
Dubuque, do	4.6	5.5	5.0	5.9	2.2	2.2
Platteville, Wisconsin	5.1	7.2	3.6	7.7	1.1	.....
Beloit, do	5.7	4.4	4.9	8.1	1.7	6.5
Janesville, do	2.9	3.9	2.6	4.6	.....	.....
Milwaukie, do	2.6	6.5	.....	.....	.....	.....
Baraboo, do	3.1	7.6	5.1	.....	.....	.....
Fort Brady, Michigan.	0.7	0.7	3.9	3.3	3.2	2.6
Fort Snelling, Minnesota	0.7	4.1	7.6	1.6	2.6	2.1

Mean temperature of each month from April to September, 1853, at various stations in the United States.

	April.	May.	June.	July.	August.	Sept.
Albion Mines, N. S.	38.9	50.7	61.6	69.1	65.0	.....
Montreal, C. E.	42.1	54.9	68.7	68.0	60.1	57.6
Fort Sullivan, Maine	40.6	48.7	56.1	60.9	61.3	.....
Carmel, do	41.2	55.4	64.0	69.5	66.1	53.0
Bucksport, do	44.3	55.8	66.0	72.0	.....	.....
Biddeford, do	.....	58.4	69.4	73.6	70.2	.....
Londonderry, New Hampshire	44.8	56.2	67.0	70.0	68.4	62.4
Francestown, do	42.9	55.5	68.9	70.1	.....	.....
Dublin, do	39.3	52.8	65.0	*67.2	64.9	60.0
Manchester, do	46.8	59.3	69.5	72.5	69.2	62.8
Concord, do	45.5	58.7	69.3	71.5	68.6	60.7
Brandon, Vermont	42.3	54.7	67.5	66.8	67.3	57.8
St. Johnsbury, do	39.4	54.4	65.0	65.9	.....	.....
Burlington, do	43.9	57.0	69.2	70.5	69.8	60.5
Worcester, Massachusetts	44.7	57.2	68.6	71.7	68.7	61.6
Amherst, do	44.0	56.5	67.0	68.4	69.3	59.7
Newburyport, do	44.8	56.8	67.0	71.5	67.2	61.6
N. Attleboro, do	44.8	57.1	67.4	72.2	.....	61.7
Barnstable, do	44.3	55.2	66.7	71.0	71.0	64.6
New Bedford, do	44.9	55.2	64.8	69.7	68.7	61.9
Smithville, Connecticut	42.8	58.4	67.5	.....	.....	.....
Pomfret, do	42.7	56.1	66.1	68.6	68.7	61.3
New London, do	46.3	57.6	66.7	70.4	72.1	64.3
Fort Hamilton, New York	47.1	59.0	67.0	73.5	74.2	68.7

*First 10 days.

MEAN TEMPERATURE—Continued.

	April.	May.	June.	July.	August.	Sept.
Fort Columbus, New York	48.7	60.8	71.2	72.7	73.5	67.1
West Point, do	46.4	59.6	69.1	70.8	71.4	70.2
Beverly, near W. P. do	48.0	60.0	70.0	69.1	70.7	64.2
Madrid, do	43.0	54.8	69.0	68.5	68.9	.....
Gouverneur, do	39.7	54.6	69.8	70.7	70.3	57.7
Baldwinsville, do	44.7	56.2	69.3	67.5	68.9	60.4
Lodi, do	42.7	56.9	69.5	69.5	70.0	62.4
Seneca Falls, do	.....	.....	70.5	70.0	71.0	63.0
Buffalo, do	.....	52.4	68.2	69.0	70.1	62.4
Bloomfield, New Jersey	48.6	60.2	69.9	71.3	71.8	65.2
Newark, do	49.7	61.3	71.1	73.1	.....	.....
Burlington, do	51.0	61.9	72.6	74.1	73.8	66.6
Ceres, Pennsylvania	42.1	50.5	.....	.....	.....	60.4
Moss Grove, do	43.1	58.3	71.5	68.8	68.5	61.1
Indiana, do	47.1	57.5	.....	.....	.....	.....
Hollidaysburg, do	48.5	59.5	72.5	73.4	69.7	62.9
Pittsburg, do	48.0	61.0	74.0	72.0	71.0	64.1
Bedford, do	49.6	59.7	72.5	73.3	72.6	.....
Gettysburg, do	50.2	62.1	74.9	74.7	73.0	66.0
Norristown, do	51.8	61.9	73.2	73.2	73.1	66.4
Morrisville, do	49.0	61.6	71.6	71.9	71.6	65.5
Harrisburg, do	52.9	65.7	79.0	79.6	78.1	70.7
Lima, do	49.5	60.7	71.5	72.9	71.2	64.5
Philadelphia, do	54.4	65.3	75.3	76.4	75.7	68.4
Baltimore, Maryland	54.9	65.9	77.7	78.5	77.9	70.7
Schellman Hall, do	52.6	63.5	74.0	74.2	77.2	67.6
Frederick, do	52.6	64.3	77.2	77.2	75.3	67.2
Smithsonian Institution, Washington	54.9	65.8	75.0	74.5	77.5	69.4
Winchester, Virginia	53.8	64.7	78.6	.....	.....	67.8
Alexandria, do	54.4	65.0	76.0	76.4	76.0	68.2
Lewisburg, do	55.0	63.6	74.0	75.0	75.5	68.1
Buffalo, do	56.3	64.4	77.0	75.1	75.7	.....
Brunswick co., do	60.0	69.0	82.3	.....	75.1	.....
Portsmouth, do	57.4	67.8	79.6	.....	.....	.....
Richmond, do	56.5	66.1	76.2	76.8	77.5	.....
Fort Monroe, do	55.7	65.2	74.0	78.1	77.7	72.2
Scuppernong, North Carolina	60.4	68.8	.....	79.1	76.3	71.6
Chapel Hill, do	60.2	66.1	76.4	77.1	76.4	69.7
Thornby, do	60.2	68.0	78.9	.....	.....	.....
Camden, South Carolina	65.7	72.0	79.3	80.3	78.6	73.1
Fort Moultrie, do	66.4	73.4	78.5	82.8	80.1	76.8
Savannah, Georgia	68.1	74.0	79.0	81.5	79.4	75.8
Sparta, do	65.7	71.9	81.6	82.8	80.0	.....
Whitemarsh Isl., do	67.0	71.8	77.4	80.9	78.6	74.8
Penfield, do	.....	.....	.....	77.8	76.7	70.4
Culloden, do	66.4	72.8	81.7	81.6	80.4	74.0
Perry, do	67.2	73.7	.....	.....	.....	.....
Jacksonville, Florida	71.0	77.3	78.9	81.7	82.5	77.6
Key West, do	76.2	79.4	80.5	83.4	83.9	.....
Cedar Keys, do	72.9	78.1	80.1	83.2	81.9	79.3
Knox Hill, do	69.2	74.5	78.7	79.9	79.9	76.8
Tallahassee, do	71.3	77.8	80.6	80.0	81.0	78.0
Pensacola, do	70.0	74.2	80.0	82.1	82.4	78.4
Eutaw, Alabama	.....	73.4	83.7	81.4	81.2	.....
New Orleans, Louisiana	69.8	72.9	80.4	80.2	79.6	75.9
Austin, Texas	71.4	75.3	80.8	82.0	81.0	76.8
New Weid, do	78.6	81.3	80.8	81.9	82.6	78.0
Ft. Graham, do	66.8	72.9	79.7	80.5	84.5	.....

MEAN TEMPERATURE—Continued.

	April.	May.	June.	July.	Aug.	Sept.
Armstrong Academy, Cherokee Nation	67.5	71.3	79.1	80.5	84.7	.....
Fort Towson, Cherokee Nation	64.0	67.5	78.3	80.0	81.0	74.3
Memphis, Tennessee	63.9	70.0	82.2	81.2	81.1	.....
Lebanon, do	60.5	66.3	79.5	77.7	.....	.....
Glenwood, do	60.3	65.3	76.4	75.4	74.5	69.2
Dixon's Spring, do	59.3	66.0	79.0	78.0	.....	.....
Knoxville, do	59.4	63.8	75.3	.....	.....	.....
Danville, Kentucky	58.2	67.5	79.3	76.6	76.5	69.6
Millersburg, do	.....	63.8	78.1	75.6	74.9	66.8
Springdale, do	56.5	62.5	75.3	73.0	73.0	70.0
Cincinnati, Ohio	56.4	66.5	79.3	75.6	.....	.....
Hillsborough, do	52.1	61.1	73.6	71.8	71.3	63.5
Jackson C. H., do	53.4	62.2	74.4	74.3	72.6	64.7
Germantown, do	51.6	61.3	76.0	72.7	67.9	61.9
Granville, do	51.6	61.6	74.3	.....	72.6	64.3
Marietta, do	52.1	62.4	75.0	73.1	74.0	64.2
Zanesville, do	.....	.....	76.0	76.8	75.7	.....
Cleveland, do	48.5	61.3	68.5	.....	.....	.....
Oberlin, do	47.6	59.1	75.5	70.8	73.4	68.8
Detroit, Michigan	48.5	59.6	76.5	75.0	74.5	65.8
Ann Arbor, do	45.5	56.5	71.4	79.6	72.2	61.8
Brooklyn, do	45.1	56.9	73.6	71.2	71.7	.....
Battle Creek, do	45.4	56.8	74.3	71.5	73.5	65.0
Milton, Indiana	52.5	61.4	74.9	71.4	72.1	64.4
Richmond, do	51.7	64.4	74.0	73.5	72.6	64.2
N. Harmony, do	57.9	65.7	79.3	77.7	77.2	69.6
Ottawa, Illinois	49.9	59.2	74.1	71.5	72.2	65.5
Augusta, do	51.2	59.8	73.0	72.0	73.1	66.7
Athens, do	53.2	61.9	75.4	73.3	73.9	67.8
Alton, do	54.5	63.4	75.7	74.3	74.9	67.4
Fort Madison, Iowa	50.5	60.7	76.7	75.9	76.0	67.6
Muscatine, do	47.9	56.3	70.8	68.6	70.9	.....
Keokuk, do	50.3	60.9	75.8	76.1	76.3	.....
Bowen's Prairie, do	44.4	.....	72.3	68.7	70.5	62.2
Poultney, do	.....	57.4	70.5	68.8	68.6	55.6
Dubuque, do	45.3	56.8	73.7	69.6	70.6	63.7
Platteville, Wisconsin	45.8	58.4	74.4	72.3	74.9	.....
Beloit, do	44.1	57.4	73.1	68.7	71.4	64.0
Janesville, do	45.6	51.7	73.2	69.1	.....	.....
Emerald Grove, do	45.1	56.0	70.7	69.0	71.9	.....
Summit, do	43.4	53.4	69.1	66.7	68.5	61.4
Milwaukie, do	43.6	52.2	.....	.....	.....	.....
Madison, do	44.3	54.5	70.1	67.8	70.3	61.4
Baraboo, do	45.6	56.4	74.2	.....	.....	.....
Bellefontaine, do	47.2	56.5	71.4	70.0	71.3	63.0
Lac-qui-parle, Minnesota	44.7	53.8	65.8	68.9	70.0	60.8
Fort Snelling, do	46.9	53.9	67.6	70.4	70.2	60.3
Fort Brady, Michigan	39.1	48.0	58.7	63.2	61.1	52.2
Fort Leavenworth, Missouri	55.0	60.0	73.7	75.3	75.9	68.7

Some notice of actual consequences upon production, for the present year, should properly be appended here. It is obvious, however, that in presenting statements of these results, we are liable to introduce some measure of the very error sought to be avoided by this comparison of well-determined climatic facts. What may appear conclusive

at the time of publication in local journals, perhaps proves partial or overcolored at a later period.

At the present time the mass of these results is very well known, however, and they may be generally stated as corroborative of the indications of the investigation just given. The English and foreign grain harvest suffered the greatest losses; and the consequences so clearly foreshadowed at the close of July, and known, or possible to be known, by attention to the temperature measurements received at that time from England and Northern Europe, with some definiteness even at that time, were realized in a very severe measure. Some notices of a general character will add to the force of the statement of this purely climatological result.

The tone of the following notices is uniformly sustained by all the statements of results there, at their dates, of which large numbers of instances are at hand:

"The reports from all parts of the kingdom agree in stating that the deficiency in wheat will be very serious. Several instances have come to our own knowledge, in which, upon threshing the produce of a given number of acres, the yield has scarcely exceeded half the quantity obtained from the same land in good average seasons; the deficiency, taking the kingdom collectively, will certainly amount to one-fourth, if not a third, and we shall unquestionably require to import very largely."—*London Mercantile Gazette, Sept.* 6.

"Harvest prospects are now the subject of anxiety and speculation—a subject intensely interesting to all classes alike. As a general statement, the crop may be pronounced bad for this period of the season. It will be found to hold, as a general rule, that a late harvest is a deficient one, and this season will prove no exception. The common report on this point is, that the crop is short, both as respects straw and grain; in some districts we find it set down at two-thirds of an average. On the whole, the prospects of the harvest are precarious, and an average return can hardly now be reckoned upon. And, as it is, there is no alarm throughout the country, and no excitement, save what prevails among dealers in grain, regarding our food prospects, notwithstanding the unpromising nature of the weather. The world is now before us, from which to obtain supply and make up our lack. The latest advices from the Continent speak of a defective harvest there as well as in this country, and the upward movement of the past week in Mark Lane has been chiefly caused by a large export demand for shipments to France, where the crop is said to have turned out worse than it is at all likely to do here."—*London Correspondence of Sept.* 27.

The *Agricultural Gazette and Gardeners' Chronicle* gives, in January, 1854, the following summary of results of the British harvest, collected with great care, through a general effort early entered upon by the agricultural interest. It is valuable for both the positive and comparative results it embodies, and illustrates the actual condition of British agriculture, as well as the climatological results of an unusually disastrous year:

Counties.	WHEAT.		BARLEY.		OATS.		BEANS.		PEAS.	
	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.
SCOTLAND.										
Aberdeenshire				One-fifth under		One-fourth under				
Forfarshire	27	One-fourth under	36	Good	40	One-sixth under	26	One-fifth under	22	One-fifth under
	30	One-sixth under	43	Average	50	do	40	do		
Fifeshire	25	One-fourth to one-third under.	45	One-fifth under	50	Average	48	Average		
Stirlingshire		One-sixth under		Average		One-sixth under		One-tenth under		
East Lothian	30½	One-fifth under	51	Full	60	Over	32	Full		
Mid-Lothian	30	Rather under	48	Full average	48	Full average	32	Rather under		
		One-fifth under		One-seventh under.		One-third under				
Lanarkshire	26	One-eighth under			40	One-tenth under	29	One-ninth under		
Renfrewshire	32	do	42	One-fifth under	36	One-sixth under	40	Average		
Ayr	24	One sixth under			40	Near	32	do		
Berwickshire	26	One-twelfth under.	42	Average	42	Average				
Roxburghshire	24	One-sixth under	32	do	33	One-eleventh under	24	One-eighth under	24	One-eighth under
	20	do	33	do	33	One-ninth under	27	One-tenth under	21	do
Dumfrieshire			38	do	33	One-eighth under				
	20	One-fourth under	32	One-eighth under	28	One-seventh under.	32	One-eighth under		
Wigtonshire	27	Average	40	Average	30	Under	30+	Under		
ENGLAND.										
Northumberland	20	One-fourth under	32	Average	36	Average				
	20	One-third under	33	do	48	Full average		Full crop		Full crop
Cumberland	24	One-fourth under	36	do	40	Average	45	One-eighth over	27	Average
	18	do	10	do	12	do				

Reports of harvest of 1853—Continued.

Counties.	WHEAT.		BARLEY.		OATS.		BEANS.		PEAS.	
	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.
Durham	12	One-half under	20		20		14		10	
		Much under		Much over		Under		Average		Average
Westmoreland	24	One-eighth under	33	One-tenth under	36	One-ninth under	30	One-fifth under		
	22	Under	33	Full average	40	Four above				
Yorkshire	27		40		48		32		32	
	25	One-fourth under	40	One-tenth under	44					
	24	One-sixth under	36	Average	44	Under	36	Average		
	18	One-fifth under	32	do			24	do		
	20	One-fourth under	40	do				do		
		One-third under		do		Average		Under average		
Lancashire		One-fourth under				Rather under				
	22	One-third under	45	Average	45	Under				
	28	do	38	One-fourth under	50	Average				
	22	Much under	39	Full average	36	Not average				
Cheshire	16	One-third under	30	Average	35	Average	20	One-third under	20	One-third under
		Much under		do		do		Good		
	18	One-third under	40	do	40	do				
Derbyshire					36	One-third under				
	25	One-fourth under			40	Average				
Nottinghamshire	24	One-third under	40	Average			24	One-third under	24	One-third under
	20	do	36	do	36	Under	20	do	20	do
	22	One-third to one-half under.	36	One-third under				Under		
Lincolnshire	26	One-third under	32	One-sixth under	50	One-fifth under	34	One-eighth under	28	One-third under
	32	One-ninth under			44	do			20	do
	28	One-seventh under	40	One-tenth under						
Shropshire	15	One-third under	20	Under						
Staffordshire	16	Near one-half under	35	One-eighth under	40		20		20	

Leicestershire	22	One-fourth under	40	Average	44	Under	34	Over	30	Average	
	20	One-fifth under	32	One-sixth under	40	One-sixth under					
Rutland	28	Average	34	One-sixth over	35	One-eighth over	24	Average	24	One-seventh over	
Herefordshire	25	One-sixth under	30	One-fourth under							
	20	One-fifth under	30	One-tenth under							
Worcestershire	18	Two-fifths under		Average				Near average		Deficient	
	12	One-half under	33	do		Average	36	Over average		Very bad	
	16	One-third under	36	One-sixth over			36	One-sixth over	10	Two-thirds under	
	18	do	40	Average	40	Average	24	One-fifth under	24	Average	
	19	Two-fifths under	28	One-third under	30	One-fourth under	24	do	12	One-half under	
	18	do	30	One-sixth under	30	do	30	Average		Very bad	
Warwickshire		Not half		Much under		Rather under		do		Various	
	18	Two-fifths under	40	Average		Much under	36	do	24	One-fifth under	
	19	One-third under	32	One-fourth under			27	One-sixth under	22	One-fourth under	
Northamptonshire	24	Rather under	40	Average	40	Under	32	Average	24	Under	
	24	One-fourth under	48	Full average	24	One-sixth under	40	Full average	12	Two-thirds under	
Huntingdon	18	One-third under	36	One-tenth under			36	Average	32	Average	
Cambridgeshire	28	One-fifth under			56	One-tenth under	34	do			
Norfolk	20	One-third under	32	One-fifth under							
	30	One-eighth under	44	Average	48	One-seventh under	36	Average	16	One-half under	
	22	One-fifth under	32	One-third under	48	One-fourth under	24	One-third under			
Suffolk		One-third under		Barely				One-fifth under		One-third under	
	20	One-fourth under	32	One-fifth under			16	Two-fifths under	10	Two-thirds under	
	20	One-third under	36	Average	52	One-tenth under	22	do	16	Half	
	20	One-sixth under	30	One-seventh under	48	Under	24	One-seventh under	16	Very bad	
Essex	16	Two-fifths under	28	One-eighth under	32	One-sixth under	24	Average	16	One-third under	
	18	do	28	One-fourth under	40	Average	40	One-fifth over	14	Two-fifths under	
	14	One-half under	28	Two-fifths under	36	One-fifth under	20	Average	16	One-third under	
Bedfordshire	15	Two-fifths under	32	One-fifth under	40	One-sixth under	30	do	25	One-sixth under	
Buckinghamshire	14	One-half under	28	do	30	One-fourth under	24	One-fifth under			
	24	One-third under	38	One-fourth under	34	Much under	40	Over			
Oxfordshire	16	do	40	Average	45	Average		do			
	24	One-fourth under	40	do	24	Under	36	do	18	One-fourth under	
Gloucestershire	20	One-third under	30	do	30	One-fifth under	30	Average	20	Two-fifths under	
	18	One-fourth under	32	do	30	One-fourth under	24	One-fourth under	32	Average	
	20	do	38	do	40	Average	26	Average	18	Near	
Somersetshire	24	Average	32	do	40	do	28	do	16	One-third under	
Wiltshire	22	One-third under	28	do	40	do	28	do	20	One-fourth under	
	22	do			40	One-eighth under	24	do	24	One-sixth under	

Reports of harvest of 1853—Continued.

Counties.	WHEAT.		BARLEY.		OATS.		BEANS.		PEAS.	
	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.	Bushels per acre.	Compared with an average crop.
Wiltshire—Cont'd	20	One-third under	36	Average	40	Bad	32	Average	26	Under
	18	One-fourth under	30	One-sixth under	40	Average	38	One-sixth over	28	One-fifth under
Berkshire	16	One-third under	36	One-tenth under	44	One-twelfth under	28	One-eighth under	26	Over
	20	do	40	One-twelfth under	48	One-seventh under	30	Under	24	Under
	25	do	40				32	Fair		
Sussex	12	One-half under	28	One-eighth under	28	One-fourth under	20	Two-fifths under	20	One-third under
	20	Two-fifths under	32	One-fifth under	60	Under	20	Under	10	Much under
Surrey	16	Half under	24	One-fourth under	40	Average				
Kent	28	One-third under	40	One-sixth under	50	One-fifth under	32	One-seventh under	24	One-third under
	20	Two-fifths under	28	One-fourth under	48	One-seventh under	48	One-third over	32	Average
	26	One-sixth under			52	One-tenth under				
Hampshire	16	One-third under	16	One-third under		Under	12	Two-thirds under		One-fourth under
	12	One-half under	16	Two-fifths under	24	Two-fifths under	16	One-fourth under	12	One-half under
	18	One-third under	28	One-seventh under	40	Average	26	Over	24	Average
	18	Two-fifths under	32	One-ninth under	48	do	20	Two-fifths under	18	Two-fifths under
	16	Nearly one-half	28	One-eighth under	44	One-twelfth under	20	One-third under	18	do
	20	Two-fifths under	32	One-fifth under	56	One-eighth under	20	Three-fifths under	8	Two-thirds under
	16	One-third under	26	Average	36	Average	20	One-sixth under	16	One-third under
Dorsetshire	24	One-half under	32	Not average	38	do				
	12	More than half under.	22	One-fifth under	24	One-fifth under				Failure
	28	One-fifth under	36	One-fifth less			32	One-fifth under	40	One-fifth over
Devonshire	12	One-fourth under	30	Average						
		Half a crop		do		Average				

CLIMATOLOGICAL PECULIARITIES OF THE YEAR 1852 IN RELATION TO AGRICULTURE.

The characteristics of the year 1852 were much less striking than those of 1853, in the relation of the current climate—as its meteorological conditions may be termed—to the general agricultural prosperity. It did not differ largely from average years in temperature or amount of rain for the months affecting cultivation, though the winter, or January particularly, was unusually distinguished by extreme cold. The following table exhibits the number of degrees of difference for the year 1852 from the mean temperature for a considerable series of years at each station. The quantities are given without a mark where the temperature was greater, and with negative signs where it was less for each month.

Comparison of the temperatures of 1850 *with the general mean.*

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
Concord, N. H.	-3.9	0.3	-3.5	-3.2	2.3	0.2	-1.0	1.6	0.5	-1.7	-2.2	6.7	-1.3	0.8	-1.1	1.1	-0.1
Cambridge, Mass.	-4.6	2.3	-0.8	-3.1	2.1	1.6	1.2	-2.0	0.7	1.2	-1.0	6.6	-0.6	0.3	0.3	1.4	0.5
New Bedford, Mass.	-4.5	0.0	-0.9	-3.0	0.5	1.2	1.2	-1.8	0.0	0.7	-2.2	6.0	-1.2	0.2	-0.5	0.5	-0.3
New York	-5.5	0.2	-1.7	-4.8	0.8	1.2	2.1	-0.1	-1.4	1.5	-1.8	7.1	-1.9	1.1	-0.6	0.6	-0.3
Rochester, N. Y.	-6.0	0.9	-0.9	-5.2	-0.1	0.3	0.2	0.5	0.1	2.5	-1.3	5.9	-2.1	0.3	0.4	0.3	-0.4
Philadelphia	-6.6	0.0	-1.1	-5.6	-1.0	1.0	1.2	-1.3	-0.5	2.3	-2.8	5.7	-2.6	0.3	-0.3	-0.3	-1.0
Baltimore	-6.8	-0.6	0.6	-4.7	2.1	-0.6	0.4	-1.0	-1.8	4.0	-3.4	4.0	-0.7	-0.4	-0.4	-1.1	-0.9
Washington	-5.8	-1.0	1.0	-4.8	0.2	-1.4	-0.4	-3.0	-1.3	4.5	-2.7	4.4	-1.2	-1.6	0.2	-0.8	-1.1
Chapel Hill, N. C.	-6.0	1.6	2.5	-3.0	1.6	-1.9	-0.2	-2.2	-1.9	3.7	-3.7	3.3	0.4	-1.4	-0.6	-0.4	-0.7
Savannah, Ga.	-8.3	1.2	2.0	-4.6	-1.8	-4.0	-1.3	-2.9	-2.4	2.2	-1.2	3.6	-1.5	-2.7	-0.5	-1.2	-2.0
Key West	-3.9	-1.6	0.8	0.3	0.0	1.0	-0.4	0.4	-0.1	1.0	1.5	3.5	0.7	0.3	0.8	-0.5	0.4
Mobile	-8.1	3.0	2.5	-3.0	2.8	-1.7	-2.0	-2.7	-1.0	2.5	-2.7	4.5	0.8	-2.1	-0.5	-0.2	-0.4
New Orleans	-7.8	3.2	2.0	-2.0	0.8	-0.5	-0.8	-0.7	-0.3	1.8	-2.5	4.0	0.3	-0.7	-0.3	-0.2	-0.3
San Antonio, Texas	-5.8	4.3	2.0	-2.5	3.5	-1.2	-0.5	-0.7	-2.0	1.1	2.0	2.5	1.0	-0.8	0.4	0.3	-0.3
Memphis	-5.4	2.0	1.2	-2.0	0.8	-1.5	-1.0	-2.7	-1.0	4.3	-1.6	5.3	0.0	-1.7	0.6	0.6	-0.6
Cincinnati	-5.2	2.8	2.9	-3.8	1.1	-0.9	1.5	-1.4	-0.4	5.6	-3.0	6.1	-0.1	-0.3	0.7	1.2	0.5
Detroit	-4.0	-1.1	0.1	-1.5	2.4	-2.0	1.0	-0.4	-0.6	4.0	-1.0	3.5	0.3	-0.5	0.8	-0.5	0.0
St. Louis	-5.0	4.0	3.5	-6.0	1.0	-2.3	0.1	-4.0	0.5	7.2	-2.0	4.0	-0.5	-2.1	1.9	-1.0	-0.6
Milwaukie	-4.5	-1.3	-2.9	-1.5	2.5	0.8	0.6	0.6	-2.3	2.6	-5.0	3.0	-0.6	0.7	-1.6	-0.9	-0.8
Fort Snelling	-2.3	4.6	-1.3	-1.3	-0.8	0.6	-0.7	1.2	-4.9	5.9	-6.3	-3.3	-3.1	0.4	-1.8	-0.3	1.6
Puget's Sound	4.1	3.0	-1.0	-2.1	1.6	1.0	0.5	0.6	-0.3	-0.7	2.7	-6.1	-0.5	0.7	0.6	0.3	0.3

The winter months are seen, by these comparisons, to have been very variable—January very cold and December unusually warm—but the only consequences important to our present purpose, resulting from these facts, were some injuries to tropical trees and plants in the extreme South, and to fruit and delicate trees generally, by the severe cold of January. April was also a cold month, and its low temperatures were prolonged into the early part of May in the Central and Southern States, retarding the progress of the principal staples considerably. The greater advancement of Southern agriculture at this season rendered this change more severe south of Philadelphia than in the States north. The cold of this month was quite universal, and the injury to fruit and fruit trees from this, and the great extreme of January, was scarcely less than in any previous instance. At Philadelphia, it was regarded as colder than any previous April for sixty-three years.

The differences of temperature for the remaining months, to October, are unimportant, and wholly within common limits. October was unusually warm, November colder by an equal measure, and December

again reversed the change. The last two months are, however, of very little importance to the current cultivation of the year.

In Europe, the comparison of temperatures for the year 1852 exhibits some remarkable differences, for the winter months, from those observed in the United States. There was not, however, any very remarkable change in the summer temperatures from the general mean, or any remarkable consequences on the harvest. The production was better than usual, on the whole, so far as can be learned, and the great Eastern granary of Europe near the Black sea, and in Central Russia, sustained its usual character of abundant grain harvests.

Comparison of temperatures for 1852 *in Europe with the general mean.*

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	Year.
London, Greenwich Observatory	6.3	2.6	0.4	0.2	-1.1	-1.9	5.3	1.6	0.5	-1.4	6.5	8.8	-0.2	1.7	1.9	5.9	3.1
Paris	6.2	1.0	-3.9	-3.8	0.4	-0.9	6.8	0.7	-0.5	-1.6	7.4	8.0	-2.4	2.2	1.8	5.1	2.2
Berlin	10.6	3.7	-2.7	-5.7	0.7	-0.6	3.2	1.8	-0.2	-2.1	3.8	7.3	-2.8	1.5	0.5	7.2	2.1
St. Petersburg	3.0	-0.7	1.0	-8.5	-1.4	1.4	-4.5	-0.6	1.4	-7.0	-8.1	....	-2.9	-1.2	-4.6	....	....
*Poltova	-1.7	-5.3	-3.3	-6.2	0.0	5.1	-4.2	1.3	0.7	-1.7	1.2	....	-3.2	0.7	0.1	....	....

* In the Black Sea district of Southern Russia.

The winter months are seen to have been unusually warm in Europe, the cold January in America being there reversed. April was cold, as in the United States; and the summer months warmer than usual in Western Europe, though irregular in the East. The autumn was apparently quite opposite in temperature in different parts of Europe, especially for the month of November. London and Paris were many degrees warmer than usual, and St. Petersburg as many degrees colder. The comparison of several stations in the north of Europe is conclusive of the accuracy of the results given for St. Petersburg.

The European season was, on the whole, unusually favorable to its immense and sensitive harvest interests, and the contrast with the following year quite extreme for the usually equable European climate.

In the United States the amount of rain is always important, and almost equally so with the temperature. The range is here greater than in Europe in the distribution of rain for single months, and extremely irregular in respect to the districts where these droughts or excesses fall. For 1852 we may give a brief general sketch, with sufficient precision for the present purpose, and without tabular arrangement.

In the New England States, the early part of the summer was deficient in rain. In Maine, May was the most deficient, and the previous months had some excess. In Vermont, April and May were very dry; and in Massachusetts, and the south of New England, "the long-continued and wide-spread drought of 1852" embraced May, June, and July. August was a very wet month, and the remainder of the season much as usual. For the year, the amount of rain was very near the general mean, and the deficiency in the early summer was made up in March, April, and August.

Eastern and Northern New York, with part of Canada and Michigan, were deficient in rain through the same period. In Michigan, "the middle of May to the 20th of June" was without rain for some parts of the State. August was profusely rainy in Eastern New York, New Jersey, and Eastern Pennsylvania. Further west, and in Ohio, Michigan, and the adjacent States, the summer was more than usually dry, for August particularly. In Michigan and Wisconsin very little rain fell in August.

In the Central States near the Atlantic, April and August had a large amount of rain; and for the whole year the excess, in this part of the United States, was about five inches, or more than one-tenth of the average amount. There were no droughts of importance.

In the South, the distribution was irregular. In Florida and on the coast of South Carolina and Georgia, the three summer months were profusely rainy, but in the range of the Gulf States generally they were very variable. In the States near the Gulf, from Pensacola to New Orleans, June and September were very dry; and all the Central States south had near ten inches less for the year than the mean annual amount. October, in part, and November particularly, were wet months in this district, however; and coming at the close of the cotton-ripening season, and with more than usually high temperatures, some considerable injury resulted to this crop.

In the States bordering the Mississippi and next to those on the north, the amount became as large as usual for the year, and had few important peculiarities of monthly distribution. February, August, and December were wet months in Tennessee, and June and October were comparatively dry. The extremes did not, however, fall within the cultivable period in any important measure.

In the Ohio valley there was about four inches more than the usual amount of rain, the excess falling in December. Further west, in Indiana, Illinois, Missouri, and Iowa, the amount for the year was something more than usual, also, but the summer distribution more irregular. At St. Louis, March, May, and June were wet, and the summer, from June forward, unusually dry. In Iowa the autumn was unusually wet.

The distribution of rain for 1852 was less extreme and variable than usual. The droughts of Michigan and the New England States were the only injuries of importance to agricultural interests, though these were felt severely in those districts.

The year was little remarkable in its climatology through the season affecting cultivation. The temperature extremes of the winter months were very great, and some points of great scientific interest appear in that connexion. The compensations in temperature between the United States and Europe, or between distant portions of the same hemisphere, whether on the same continent or not, are very strikingly shown in the temperatures of London, Paris, and Berlin, at 6° to 10° above the mean temperature, while the eastern and southern portions of the United States were as many degrees below. On the Pacific coast, in California and Oregon, January was 2° to 5° above the mean temperature. Even at Fort Snelling there was much less difference than at New Orleans.

Careful statistics of the several staple crops of any year are, unfor-

tunately, very difficult to obtain for the United States. Those at the South, for cotton, sugar, &c., are much more precisely noted than the grain crops, and for the year 1852 we have some careful estimates of the cotton crop by eminent Southern authorities. Prof. McCay, of Georgia, and G. G. Henry, esq., of Mobile,* estimate the entire cotton crop for 1852 at 2,750,000 bales. The whole amount sent forward is larger, and is placed by these authorities at near 3,015,000 bales, and by New York cotton brokers at 3,260,000 bales. The last estimate is confirmed by the actual receipts up to September, 1853, which reached a total of 3,250,000 bales. This amount is much above that for any previous year, though less of this increase is due to a better crop than to the extension of cultivation generally. It was considerably injured in many localities by storms and weather changes. The crops for 1851 and 1852 are both designated as large by the best authorities of the South, however, and it cannot be doubted that the seasons were generally quite favorable. The crop of 1851 is very uniformly given at 2,355,000 bales—or the receipts, rather—of which it is not quite certain that the same amounts were in each year forwarded of that grown in the previous year. The above authorities assign only 37,000 bales as this difference, however, leaving the crop of 1851 less by a considerable measure than that of 1852.

CLIMATOLOGICAL NOTES FOR THE YEAR 1851.

The characteristics of climate for this year may be grouped and exhibited more readily than for either of those just given. Those of temperature will be given in a few comparisons without tabular statement.

In the New England States, the mean temperature of each of the several months forward to November, is almost precisely that of the mean of a series of years at each station. The differences never exceed two degrees, and fall equally on each side, and variously at stations near each other, in such a manner as to show them to be within the limits of imperfection of the series, or of error of observation. For November and December the year was colder by about two degrees for the first and five degrees for the last month. For the year, the mean falls almost precisely at the general mean.

In New York, the result was very nearly the same, a slight falling off of the mean for the year being exhibited also.

In Pennsylvania, Maryland, and Virginia, the results were quite the same, though February and March became decidedly above the mean temperature, and the year rather above than below. This condition holds through the States southward to Florida. In Western Florida, the differences are less, though February remains three degrees warmer than usual, and September is as much below and October as much above the mean. That for the year remains the same.

At New Orleans these differences are similar, but less. In Tennessee, and adjacent districts, the differences are less than elsewhere among the months, and the year slightly above the mean temperature.

In Ohio, the differences were much as in the Eastern States in the same latitude—February and March warmer, and December colder than

* De Bow's Review for March, 1853.

usual. The summer was unusually uniform, and the year a fraction of a degree above the mean temperature. At St. Louis and northward, the same differences are found, though they are less for any single month than in Ohio. At Fort Snelling they remain the same.

The most striking uniformity of temperatures prevailed on the Pacific coast, also, for 1851, both in Oregon and California. April, August, and December were each one to two degrees warmer than usual, and the year nearly a degree warmer in Oregon, though not so much in California.

In England, the spring and autumn were some degrees below the mean temperature for some months—April, May, September, and November. These were balanced by high temperatures in January and October, and the year was nearly as usual. None of the differences were so great as in subsequent years.

In all parts of Europe the results were quite uniformly as in England. Even in Central Russia, at Moscow, similar general temperatures occurred, with the exception that September and November were above instead of below the general mean.

No previous year in the records of temperature has exhibited greater uniformity than 1851 for the great range we may bring into comparison, and this peculiarity has induced a reference to it not absolutely required in this connexion. It was a year of great and general success in agricultural pursuits, as far as may be learned.

The amount of rain for the year 1851 was large in the Northern States—in Maine and the elevated portions of New York and Pennsylvania, and in Iowa and Illinois particularly. In the last-named States it reached the very large amount of sixty-four inches, and it came near fifty inches in Maine. The Central States, from New Jersey to Tennessee, were as largely deficient in amount of rain, and fell off fully ten inches from the annual mean. In the Southern States, it was again fully as large as usual, and in Lower Florida much greater. The excess in Maine was in April and October; in other parts of New England, and in New York, the same months, with July and November, gave a large fall of rain. No part of the year was particularly dry.

In the West, the great excess fell in the summer months, May included. Each of these was very wet, and January very dry. September was also dry.

In Ohio, or at Cincinnati particularly, the whole amount for the year was but little over thirty inches. In January and September scarcely any rain fell, and all seasons of the year were deficient more or less. There were less severe droughts in the months affecting cultivation, however, than would appear probable from the generally dry character of the year. In the Central States, eastward, the falling off was mainly in winter and autumn also, though June was comparatively dry.

In the South Atlantic States, the summer was very wet. Some extremes of temperature occurring in April and May were injurious to the planting interests, though they do not appear in the means of temperature, and for the remainder of the season there were many local injuries from summer storms and profuse rains. In Florida, some of these were very severe, and they were generally more than usually frequent and profuse in this part of the South. Westward, in Louisiana and

Texas, the summer was more than usually dry, yet not particularly injurious from this cause, except at the border of the plains, where there seems to have been very little for the entire three months of summer.

The statistics of agricultural production for distinct years are extremely difficult to procure, yet they are nevertheless among the most important of commercial data. The amount of any staple sent forward is comparatively easy to obtain for any year; yet the controlling element is the amount produced, which may be withheld in the hands of producers to a large extent, under low prices. There appears no mode of determining this so effectively as by direct solicitation in communications, at the close of the year; and a thorough digestion of such returns from the present sources of communication to the agricultural report, would give an exhibit of great value, commercially, for every year. At present, very few estimates of this sort are made. For the three years for which we have undertaken to determine the climatological character, and its great and decisive influence upon agricultural production, few have given precise statements of any year's results, and its relation to the general or average productions. The table given in connexion with the exhibit for 1853 is also almost the only English statement of the kind.

This remark is suggested by the great difficulty of giving definite results in connexion with this climatological distinction for successive years. Of the amount brought to tide-water in New York for any year, it is quite impossible to distinguish that grown in the year for which the statement is made, and the statistics given under that head are by far the best procurable of the grain produce of the United States. For Southern staples we may be more precise, and for cotton and sugar some clear statements may be made. In the extension of all these descriptions of cultivation, a per-centage of advance is always due to the opening of new lands, and the measures we have must be modified by the amount of this advance to render them decisive of the changes in successive years.

The amount of agricultural produce passing through the New York canals was nearly the same for wheat, flour, &c., as in the two previous years.

	1849.	1850.	1851.
Flour, barrels	3,263,087	3,256,077	3,358,465
Wheat, bushels	2,734,389	3,670,754	3,163,682
Indian corn, bushels	5,121,270	3,228,056	7,670,345

This statement would show a large and uniform production for the years embraced. It was, however, scarcely equal to the usual per-centage of increase due to the increased area coming into cultivation. In the exports a more considerable falling off occurs. These were very large in 1848, after two abundant harvests, and with extensive European failures, as in 1853.

Aggregate value of breadstuffs and provisions exported from 1848 *to* 1852.

Year ending June 30, 1848	$68,701,921
Do. 1849	37,472,751

Year ending June 30, 1850	$38,155,507
Do. 1851	26,051,373
Do. 1852*	35,000,000

These are but indirect exhibits of the abundance of the harvests for each year; but they are the most satisfactory of those accessible at present.

The crop of cotton for the three years is given by Prof. McCay, ot Georgia, with great accuracy, in the several papers published by him on this subject, and these generally exhibit great uniformity of production in this most sensitive crop through these years. The corrected comparison, by Mr. Henry, gives 2,355,000 bales to 1851, and 2,932,000 to 1852; with the remark that the crop of 1853 will not probably exceed the last amount. Prof. McCay, after a graphic and clear enumeration of the climatological peculiarities of the summer of 1853, the drought in Georgia and the Atlantic States, the storms in Florida, the wet weather and rot in Mississippi and the Central States, and the unusually fine climate and crop in Texas and Tennessee, assigns 3,100,000 bales as the amount for 1853, in his earliest paper on the subject, embracing this year. Subsequently,† he gives the following statement of the crops and estimates:

	1851.	1852.	Estimate for 1853.	Estimate for 1854.
Bales	2,355,000	3,015,000	3,263,000	3,000,000

This statement applies to *receipts for the years named*, and is not, therefore, distinctive of the amount produced in each season. It throws the losses of 1853 forward into the estimates for 1854 mainly, and of the general climatological effect Prof. McCay again remarks as follows:

"From South Carolina and Georgia, a considerable decline may be expected. The first crop of bolls was small on account of the drought; the second was lessened by rains; and the third was generally cut off by the October frost; but many places have escaped one or the other of these calamities, and the deficiency of receipts at Charleston and Savannah will be made up in part by increased shipments from Columbus and the Tennessee river. Instead of 813,000 bales for the last year, 750,000 may be expected for 1854. From Florida, the falling off

---

* A comparative statement for this year is not given by the same authority, and is taken from tables in Hunt's Merchants' Magazine, where the value of "domestic produce" is given as follows for the three years:

1850	$43,957,012
1851	39,164,775
1852	40,716,781

The comparison for the last two years on the leading grains is as follows:

	1581.	1852.
Wheat, bushels	1,468,465	3,124,226
Flour, barrels	1,264,322	1,365,597
Indian corn, bushels	1,605,674	758,438

The first table should give about $35,000,000, evidently, as the export for 1852.

† De Bow's Review for April, 1854.

will be small. The crops on the Flint and Chattahoochee rivers are much better than last year; the planting has been larger; they have had no disastrous storms; and the October frost did not everywhere stop the growth of the plant. The estimate for 1854 may be put at 160,000 bales.

"From Alabama the reports are various and contradictory. Up to July, the promise was never better; but the wet weather brought the boll-worm on many plantations, and its ravages were at some places very great. The frost then came and destroyed all hope of the late crop of bolls, though in many places this frost was not destructive, and through the whole month of November the fine weather for opening and gathering the crop favored the planters very much."

For the districts or area cultivated, the cotton crop of 1853 is undoubtedly the least of the three years, and that of sugar the greatest.

The sugar crop of 1852 is given by Mr. Champomier at 321,934 hogsheads for Louisiana, and 11,023 for Texas. He designates it as "one of the greatest ever known" for the area embraced, as the advanced cultivation gives it a great precedence in absolute amount.

For the remaining staples it is so difficult to procure definite statements for distinct years, that further statistics cannot be embraced in this connexion. With the measures of variation in temperature and amount of rain which control the result so decisively, however, the actual results should be associated. They are both primary commercial requirements, and they become such more decisively as our production is extended and the relations of supply and demand are more direct through a perfected commerce and the most prompt communication with all markets. The climate of the United States has a variability much greater than that of Europe, with differences among its different districts also unknown to Western Europe, at least. The mutual relations and peculiarities of each are shown most conspicuously in the last two years, by measures and results very imperfectly sketched in this comparison.

VERTICAL RANGE OF VEGETATION.

It is less important to American climatology to determine the elevation at which the various cultivated growths are most successful, or cease to flourish, than for Europe and the Eastern continent. The northern portion of the Alleghanies only develop climatological distinctions of this sort; and cultivation has not yet sufficiently occupied their lower areas, or tried any step of ascent, to render the definition of vertical range of any value there. On the southern portions of the Alleghanies the climatic differences due to elevation hardly appear, or only in the restriction of the growth of tropical staples. Precise limits of the grains and fruits of temperate latitudes are there unknown, and no approach to distinction is apparent in the highest cultivated localities. Indian corn, of precisely similar varieties to those grown on either hand at the level of the sea, flourishes unchanged on the highest cultivated portions of the Alleghanies of Virginia, at 2,500 to 3,000 feet elevation.

On the summits of many of these mountains the forests are thin and dwarfed, but there seems no sufficient difference of climate to account

for it, and there is adequate cause in defective soil. On the more elevated ridges of the White and Green mountains of the Northeast, forest limits appear, however, which belong to climate alone. The range of deciduous trees of the various species, and of some kinds of cultivated crops, might, perhaps, be examined with some precision in these last districts, but as yet we have no observations which may be used.

In the Rocky mountains, and from these to the Pacific, elevation becomes quite important in the range of cultivated plants, and it would be a most interesting examination to ascertain the limit of the various trees, grasses, and other native growths. Elevation has not here the same significance as in Europe, however, and a new scale of points would be necessary. In a succeeding list, the range of well-known grains and forest trees is given for the Caucasus, with limits of 6,000 to 7,000 feet above the sea. In portions of our own interior the general level is scarcely less than these limiting elevations, and from this plateau, mountains rise several thousands of feet higher, clothed with grasses and forests nearly to their summits.

The absence, in our western interior, of the usual distinctions belonging to elevation, is strikingly shown in the very high and almost universal range of cacti, and in the fact that this great characteristic form of dry and hot climates only gives place to the mosses at the highest portions of the mountain plateau. Fremont remarks, only at the South Pass, itself, "cacti have become rare, and mosses begin to dispute the hills with them." Deciduous trees flourish at this elevation of 8,000 feet, and on many equally elevated tracts on various parts of the range.

The mountains of Caucasus are between 40° and 45° north latitude, and the more elevated portions of the Rocky mountains between 38° and 42°. Though we are not now able to assign limits in the vertical range of cultivation nor of native growths on this continent, it evidently differs widely from that of the Alps and the Caucasus. As a general rule, similar growths go higher here, and the massive plateau from which the mountains, properly so called, take their rise, corresponds nearly in temperature with coast districts of the same latitude near the level of the sea.

In the prospective wants of the Pacific region, all the cultivable capacity of the adjacent country must be brought into requisition, and the mountain sides and elevated valleys will be made to yield whatever they may for support of large populations. The Rocky mountains and their connected ranges south of 42° north latitude may undoubtedly be cultivated or occupied to a much greater extent than the European Alps proper, and the whole region permit some forms of valuable production.

The following list of upper limits of various growths in the Caucasus is taken from Kupffer's report of the physical (meteorological) observatories of Central Russia. The district of the Caucasus lies between the 40th and 45th parallels of north latitude, and it gives us a more precise basis of comparison, in general climate, than the district of the Alps. The precise localities named are obscure, but they all lie near Tiflis, which is south of the principal chain of Caucasian mountains, and in latitude 42° :

Limit of the graminæ and of Cereals (barley, wheat, &c.) in the Ossetie mountains of the Caucasus.

	English feet above sea.
Limit of grasses above the village of Iba	9,760
Limit of the Rhododendron Caucasicum	9,410
Limit of Cereals near the village of Calota	8,100
Do. near Zaki	7,550
Do. near Khoja	7,450
Do. near Baki	7,270
Do. on the Mt. Ardjivani	6,950
Do. at the village of Iba, (barley)	6,860
Do. at the village of Tapaukan	6,870
Do. at the village of Boçoïta	6,650
Do. at the village of Bajegat	6,430
Do. at the village of Roki	6,310
Do. over the village of Dodonastan	6,190
Do. near the village of Tedeleti, (in the forest)	5,850
Do. near the village of Guebriana, (in the forest)	5,590
Limit of vines in the village of Komta, on the river Hani	3,570
Do. at the village of Outsai, on the river Rioni	3,230
Do. at the village of Ateni, near the ruins of the monastery	2,250
Limit of forests above the village of Gomschen, in the district of Ratschink, (the birch)	8,010
Do. near the village of Tapankon	7,730
Do. on the western declivity of the mountain Guerwokha	7,620
Do. above the village of Guebriana, district of Tiflis	7,250
Do. above the village of Zoni	6,740
Do. above the Fort Djavi	6,730
Do. on the mountain Matsmind, (northwest declivity)	6,650
Do. southwest declivity of Mt. Cirkhlebert, Ossetie mountains	6,580
Do. above Manglis, district of Tiflis, (birches)	6,320
Do. southern declivity of Mt. Mtatsmind	6,250
Do. on the mountain Kildakar, district of Tiflis	5,930

Vertical range of vegetation on the Alps.

There is no thorough examination of this point accessible for the present purpose, and the notes are from scattered sources.

Vine cultivation ceases at	1,950 feet.
Limit of the chestnut-tree	3,000 "
Of the oak	4,000 "
Of the birch	4,680 "
A species of Rhododendron attains	7,800 "
Willow, herbaceous	8,000 "
The spruce fir	5,900 "
Saxifrages, gentians, and grasses, (to the snow-line)	9,000 "

Cereal grains in north of Switzerland	3,500 feet.
Maize, or Indian corn	2,800 "
Barley in south of Switzerland	5,900 "
The cherry-tree	3,050 "
The walnut	2,600 "
The walnut in the Pennine Alps	3,280 "
Mean limit of cultivated fields on the Pennine Alps	4,780 "
Limit of the beech in the north of Switzerland	4,250 "
Of the fir, in the same	5,900 "

It is to be regretted that no statistics exist of the vertical range of various plants and forest trees on our own mountain ranges. Some of those near the Pacific would afford valuable measures for comparison, and might show a correspondence with European results not found on the Rocky mountains. Pine and aspen forests certainly attain the height of 11,000 feet at the Parks, and generally near the sources of the great rivers which rise in that part of the Rocky mountains. The snow-line and limit of vegetation of every sort are undetermined. Further southwest, on the isolated mountains between Santa Fé and the Colorado of California, pine forests cover the San Francisco mountains to the summit, an elevation of 12,000 feet. Maize is cultivated in this district at an elevation of 5,000 to 6,000 feet, on the mountains of Zuñi, and others southward. The contrast afforded by the corn-fields and fruits cultivated at 6,300 feet elevation at Zuñi, with its limit at 2,500 in the Alps, may show how decisively American climates differ from the European in measures usually taken as standard.

HIGHEST TEMPERATURES IN THE UNITED STATES.

The following table is prepared to represent the principal agricultural districts of the United States in the extremes of high temperature through the several months. The first numbers at each station give the highest temperatures ever observed at the locality for each month, and a series of years has, in all cases, except those otherwise noted, been collated to obtain the positive maximum found there. The oscillations of these principal changes return in a period of ten or twelve years, and the numbers given may safely be taken as the highest to be anticipated at any time. The second set of numbers is the mean of the separate maxima observed in a series of years, and these points may be expected to be reached for every year. The last are the more important to cultivation.

The illustration of maximum temperatures as single measurements may be so uniform for all parts of the United States east of the Rocky mountains, that they have not been given in a tabular form in connexion with other temperature measures in illustrating the climatology of any staple. Reference may be made to the few representative stations given here for any one of them, though in most cases no distinctive importance attaches to this point. Generally, this uniformity of geographical range for extreme high temperatures is very important to cultivation, as proving a more decidedly high curve both of daily and monthly changes than would be found in climates giving no such single measures. The value of this peculiarity is, however, far better shown

in the monthly means, as respects the growth of plants requiring high temperatures.

Highest temperatures at stations representing the principal agricultural districts east of the Rocky Mountains.

Places.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Albion Mines, N. S	50	59	60	71	79	88	94	88	86	75	62	56
	43	44	50	62	72	83	86	82	80	71	55	45
Montreal, C. E	50	56	66	76	91	97	100	95	92	74	65	50
	42	45	55	68	85	90	93	89	86	68	60	44
Castine, Me	52	55	64	74	84	90	94	93	86	78	65	56
	42	43	52	64	75	83	87	84	78	67	55	48
Amherst, Mass	56	56	73	83	88	93	94	92	88	81	70	58
	43	45	62	75	83	85	89	85	82	73	65	44
New Bedford, Mass	58	59	73	80	90	95	96	91	88	83	68	60
	47	50	60	73	78	85	87	86	83	71	62	52
Burlington, Vt	.....	.....	.....	.....	.....	97	100	96	92	.....	.....	.....
	.....	.....	.....	.....	.....	90	93	88	84	.....	.....	.....
Rochester, N. Y	64	62	76	84	89	98	98	94	92	78	74	62
	48	45	64	76	84	90	93	87	86	73	62	48
New York	62	64	75	83	87	98	98	96	90	76	72	60
	48	50	65	74	84	88	90	86	83	72	63	50
Philadelphia	65	68	79	87	92	99	100	94	94	83	75	66
	52	53	66	80	86	91	95	90	85	76	68	54
Baltimore	66	71	81	88	93	99	100	95	92	82	73	68
	54	55	69	80	85	92	95	90	84	78	69	55
Washington	65	70	82	87	91	100	100	94	90	82	74	65
	53	56	67	79	86	92	95	90	82	76	67	54
Richmond	70	77	81	87	93	102	100	95	93	85	73	68
	.....	.....	.....	.....	.....	92	94	91	.....	.....	.....	.....
Charleston	79	80	85	88	92	94	94	92	92	84	82	79
	72	73	80	82	87	90	92	90	87	80	75	73
St. Augustine	78	79	84	88	92	94	94	93	89	85	82	78
	73	74	80	83	89	90	91	90	86	80	74	72
Key West	81	84	85	86	88	89	89	89	88	87	84	83
	80	82	83	84	87	88	88	88	87	85	82	81
New Orleans	78	80	82	87	89	94	94	92	89	87	83	80
	74	75	77	82	85	89	89	87	85	84	80	75
Huntsville, Ala	75	75	84	86	90	92	95	94	91	86	78	70
	68	70	80	82	86	90	92	90	86	81	72	67
Nashville, Tenn	69	76	78	86	89	95	99	97	90	87	80	68
	63	70	72	80	83	89	92	89	84	80	75	62
St. Louis	66	72	81	86	92	97	97	95	94	84	79	65
	62	63	75	80	85	89	92	88	86	80	71	62
Cincinnati	65	68	78	86	90	98	100	94	92	84	78	65
	62	62	73	80	84	90	94	90	85	81	70	61
Marietta	62	65	75	82	86	96	98	95	93	78	70	65
	57	59	70	74	78	88	90	87	83	73	66	60
Cleveland	57	57	69	73	83	96	94	90	91	77	63	55
	54	55	65	68	77	83	87	83	80	72	60	54
Detroit	52	53	74	81	89	96	94	96	90	78	65	55
	46	47	67	74	80	87	90	86	79	73	62	48
Milwaukie	50	55	79	80	84	92	94	94	91	76	70	52
	46	46	68	73	80	84	87	83	78	70	60	45
Muscatine, Iowa	60	71	84	86	90	96	98	96	93	86	74	63
	52	55	72	80	84	88	92	90	86	78	65	52
Fort Snelling	49	60	72	86	92	96	95	97	90	81	67	46
	45	53	65	80	86	90	92	90	83	78	62	43
Fort Gibson	71	80	89	90	94	99	99	97	95	89	84	74
	66	75	84	86	88	95	95	94	92	86	80	68
Fort Graham, Texas, 1851	76	76	86	92	94	100	104	108	105	103	90	80
San Antonio, Texas, 1851	78	78	84	87	88	90	94	94	92	86	81	78
Fort Brown, Texas, 1851	83	84	86	92	98	96	94	99	96	89	87	78

Summary statement of coinage at the United States Mint at Philadelphia during the year 1853, *by* D. STURGEON, *Treasurer.*

GOLD.

Date.	Double eagles.	Eagles.	Half eagles.	Quarter eagles.	Dollars.	Bars.	Total values.
	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Value.	
January	201,223	11,460	27,576	95,910	292,673		$4,809,388 00
February	115,040	20,233		51,886	298,435		2,931,280 00
March	249,233			108,406	458,133		5,693,808 00
April	212,590	23,706	42,486	57,498	460,045		5,305,080 00
May	65,170	18,535	36,345	203,548	644,161	$2,296,716 11	5,120,222 11
June	26,474	21,777	51,757	330,602	172,494	2,769,211 51	4,774,245 51
July	50,228	20,860	43,000	83,216	60,276	2,762,993 28	4,459,469 28
August	83,730	22,005	26,860	108,264	215,121	605,498 83	3,120,229 83
September	166,097	27,614	35,365	60,738	294,848	136,064 11	4,357,662 11
October	40,070		23,725	95,864	582,955	3,515,236 97	5,265,876 97
November	20,912			63,612	355,238	827,979 17	1,760,487 17
December	31,159	35,063	18,656	145,124	241,672	2,922,297 96	4,593,869 96
	1,261,326	201,253	305,770	1,404,668	4,076,051	15,835,997 94	52,191,618 94

SILVER.

Date.	Dolls.	Half dollars.	Quarter dollars.	Dimes.	Half dimes.	Trimes.	Value.
	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	
January						3,125,000	$98,750 00
February			44,200	95,000	135,000	2,700,000	108,300 00
March						5,575,000	167,250 00
April	39,000		1,210,020	560,010	430,020		419,007 00
May		424,008	1,196,000	610,000	760,000		610,004 00
June		646,000	852,000	740,000	800,000		650,000 00
July		552,000	1,404,000	540,000	580,000		710,000 00
August		368,000	2,324,000	590,000	520,000		850,000 00
September		498,000	3,504,000	900,000	700,000		1,250,000 00
October		436,000	3,100,000	1,540,000	1,260,000		1,210,000 00
November		160,000	1,352,000	2,960,000	3,120,000		870,000 00
December	7,110	448,700	268,000	3,638,000	5,040,000		914,260 00
	46,110	3,532,708	15,254,220	12,173,010	13,345,020	11,400,000	7,852,571 00

COPPER.

Date.	Cents.	Half cents.	Value.
	Pieces.	Pieces.	
January	386,079	.....	$3,860 79
February	200,031	.....	2,000 31
March	403,376	19,500	4,131 26
April	214,614	73,080	2,511 54
May	912,019	.....	9,120 19
June	366,732	.....	3,667 32
July	183,228	.....	1,832 28
August	559,460	.....	5,594 60
September	765,760	.....	7,657 60
October	447,955	.....	4,479 55
November	670,588	.....	6,705 88
December	1,531,289	37,114	15,498 46
	6,641,131	129,694	67,059 78

RECAPITULATION.

	Pieces.	
Gold	7,253,644	$52,191,618 94
Silver	55,751,068	7,852,571 00
Copper	6,770,825	67,059,78
Total	69,775,537	60,111,249 72

Comparative statement of the coinage of the United States Mint at Philadelphia for the years 1852 *and* 1853.

	1852.	1853.	1852.	1853.
	Pieces.	*Pieces.*		
Gold	6,095,065	7,253,644	$51,505,638 50	$52,191,618 94
Silver	21,454,790	55,751,068	847,410 00	7,852,571 00
Copper	5,062,094	6,770,825	50,620 94	67,059 78
	32,611,949	69,775,537	52,403,669 44	60,111,249 72

INDEX.

A.

	Page.
Animals, domestic	1
etherization of	59
Apples, exports of	261
history of	259
Statement of Alexander, James	257
Almond, Edward	275
Ashton, Simon T	269
Baily, Luther	273
Beyerle, H. J	274
Boyd, S. S	262
Buchanan, George	257
Burnett, Micajah	262
Carpenter, J. A	277
Dyer, Raleigh W	274
De Neven, Gustavus	276
Eichar, John	274
Fairbanks, D. A	263
Gillett, P. W	273
Goodrich, Chauncey E	271
Huntington, H. W	263
Knoop, Jacob C	273
Lay, F. W	279
Little, Henry	265
Mallory, C. F	279
McAllister, H. N	257
Minor, James L	279
Myrick, Elijah	269
Pell, Robert L	271
Preble, Abraham	263
Robey, H. R	275
Shoemaker, J. K	257
Waring, William J	257
Watts, James H	277
Webber, Samuel	279
Wiborn, Gershom	272
Apricots, origin of	282
Statement of Goodrich, Chauncey E	287
Ashes, coal, statement of Myers, M. F	87
wood, statement of Bacon, William	82
Webber, Samuel	85
Asses, introduction of	26

B.

Bacon, exports of	50
Bagging, linen, exports of	269
Barley, history of	155

	Page.
Barley, statement of De Mott, James	158
Fitch, John W	158
Fulton, Daniel	157
Spiny, John	157
Wiborn, Gershom	158
Young, John B	158
statistics of	157
Beans, history of	221
Statement of Gerolt, Fr. V	222
statistics of	222
Beef, exports of	4
Bees, introduction of	74
Statement of Maynard, William S	76
Rounsville, J. P	76
Walton, Milo	75
statistics of	75
Birds, useful, importation and protection of	71
Biscuit, exports of	128
Blackberry, New Rochelle	321
Statement of Lawton, William	321
Black-knot, described	290
Bonedust, statement of Bartlett, Levi	84
Fisher, George P	79
Fitch, John	86
Lesley, John M	80
Bread crops	96
aggregate value of, exported from 1848 to 1852	426
Buckwheat, history of	164
Statement of Bacon, William	164
statistics of	164
Buffalo, Asiatic, importation of	20
Butter, exports of	4

C.

Camels, Bactrian, importation of	61
Candles, exports of	4
Cattle, Brahmin, introduction of	20
horned, exports of	4
introduction of	1
statistics of	4
Statement of Alexander, James	17
Asheton, Simon T	10
Bacon, William	9
Bailey, Luther	16
Bartlett, Levi	13
Brumbaugh, David	9
Buchanan, George	17
Burnett, Micajah	8
Cornish, Joseph	5
Davis, James B	20
De Mott, James	14
De Neven, Gustavus	19
Drisco, George W	9
Dyer, Raleigh W	19
Eichar, John	18
Evans, Isaac R	16
Fitch, John	14
Franklin, Santarrilla S. G	16
Fulton, Daniel	9
Garth, D. C	12
Gillett, P. W	16
Hart, T. L	5
Higgins, Anthony M	5
Hurlbut, John	15

	Page
Cattle, horned, statement of Johnson, Samuel	9
Keller, Joshua S	18
Knoop, Jacob	16
Lester, H. W	18
Linton, N	17
Macy, William M	16
Mallory, C. F	10
Martin, Samuel D	7
Maynard, William S	10
McAllister, H. N	17
McClung, J. E	6
Minor, James L	12
Morris, Lewis G	15
Myrick, Elijah	10
O'Hara, Armstrong	13
Parker, Joseph	18
Phelps, William J	6
Price, Henry M	19
Sampson, Thomas W	11
Shoemaker, J. K	17
Smoot, William	19
Starks, S. H	8
Ward, S. B	7
Waring, William J	17
Winship, Edwin	6
Yerkes, J. D	11
Young, John B	14
statistics of	4
Cheese, exports of	4
Cherries, origin and history of	292
Statement of Alexander, James	257
Ashton, Simon T	294
Boyd, S. S	293
Buchanan, George	257
Burnett, Micajah	293
Goodrich, Chauncey E	294
Little, Henry	294
McAllister, H. N	257
Myrick, Elijah	294
Shoemaker, J. K	257
Waring, William J	257
Climate, American, capacity for staple crops	346
comparison of for last three years	402
east of Rocky mountains compared with that of Eastern continent	328
general character of the interior and Pacific	342
of America compared with that of Europe	335
of Valley of Great Salt Lake, Utah	344
semi-tropical, comparison of	336, 337
Climatology	327
agricultural	328
climatological notes for 1851	423
climatological notes for 1852	428, 429
Cloth, linen, exports of	202
Colza, culture of	226
Corn, Indian, colors of	101
composition of	99
exports of	102
geographical range of	98, 346, 352
origin and history of	96
statistics of	101, 102
Statement of Alexander, James	120
Armstrong, James	125
Ashton, Simon T	109
Atkins, Howard M	108
Bacon, William	108

		Page.
Corn, Indian, statement of	Bartlett, J	107
	Bowditch, Joseph	125
	Brown, sen., John	111
	Brown, H. L	110
	Buchanan, George	120
	Burnett, Micajah	107
	Case, H. A	119
	Cooke, William H	114
	De Mott, James	117
	Dewey, Osman	125
	Durley, James	126
	Dyer, Raleigh W	125
	Eichar, John	124
	Evans, John W	118
	Evans, Isaac R	120
	Fitch, John	116
	Fulton, Daniel	108
	Gilbert, E. F	124
	Gross, Peter	122
	Harris, Joshua	118
	Hart, T. L	104
	Heydrick, C. H	122
	Higgins, Anthony M	104
	Hurlbut, John	118
	Keller, Joshua S	122
	Knoop, Jacob	119
	Lay, F. W	115
	Lesley, John M	105
	Linton, N	121
	Macy, William M	119
	McAllister, H. N	120
	McClung, J. E	105
	Minor, James L	110
	Myrick, Elijah	109
	O'Hara, Armstrong	111
	Payne, William S	106
	Phelps, William J	105
	Phelps, Ralph R	103
	Powers, Heman	115
	Rounsville, J. P	114
	Spencer, Grove	109
	Spiny, John M	106
	Shoemaker, J. K	120
	Tarr, John H	118
	Waring, William J	120
	Webber, Samuel	114
	Wiborn, Gershom	116
	Winslow, Joseph	113
	Winship, Edwin	106
	Yerkes, J. D	109
	Young, John B	117
temperature limits of		354
varieties of		99
Cotton, exports of		181
fibre, investigation of		181
geographical range of		363, 369, 370
history of		178, 366, 371
of India, remarks on		195
species of		179
Statement of	Bachelder, Samuel	186
	Baldwin, James F	190
	Bazely, Thomas	191
	Colt, E. Boudinot	189
	Crawford, Hon. E	197
	Hanna, A. M	199
	Harris, Joshua	199

Page.
Cotton, statement of Philips, M. W. ... 198
Rogerson, Robert ... 182
Schaeffer, George C ... 192
statistics of ... 180, 181, 427
temperature limits of ... 358, 362, 369
Cranberries, statement of Goodrich, Chauncey E ... 324
Crops, bread ... 96
of Great Britain in 1853 ... 417
textile and forage ... 178
Curculio, remedies for ... 290, 291
Curled leaf on peach trees described ... 258
Currants, origin and history of ... 322
Currant wine ... 300

D.

Dairies, statement of Bowditch, Joseph ... 24
Burnett, Micajah ... 23
Cooke, William H ... 24
Evans, Isaac R ... 24
Gillett, P. W ... 24
Hart, T. L ... 22
Higgins, Anthony M ... 23
Dromedaries, importation of ... 61

E.

Etherization of animals ... 59
Eggs, statistics of ... 74

F.

Fertilizers ... 79
Flax, history of ... 199
Statement of De Mott, James ... 203
De Neven, Gustavus ... 204
Durley, James ... 204
Knoop, Jacob ... 204
McGowan, Alexander O ... 204
Wiborn, Gershom ... 203
Young, John B ... 203
statistics of ... 201, 202
Flaxseed, exports of ... 202
Flour, exports of ... 128
Fodder, [see grass, hay, &c.]
Frijoles, Mexican ... 223
Fruits, general remarks on ... 256
of Centre county, Pennsylvania ... 257
statistics of ... 256

G.

Goats, Cashmere, Scinde, and Malta, introduction of ... 20
Gooseberries, origin and history of ... 322
Statement of Goodrich, Chauncey E ... 323
Little, Henry ... 323
Gopher, striped ... 68
Grafting ... 266, 272
Grape diseased in Europe ... 311
history of ... 296
remedy for disease of ... 313
rot, remedy for ... 301, 302
Statement of Alexander, James ... 259
Asheton, Simon T ... 300

Page.

Grape, statement of Brumbaugh, David 300
Buchanan, George 259
Burnett, Micajah 299
Crawford, Hon. E 299
Goodrich, Chauncey E 302, 303
Little, Henry 299
Marshall, A 305
McAllister, H. N 259
Miller, Anthony 301
Minor, James L 301
Munch, Frederick 302
Myrick, Elijah 300
Robey, H. R 306
Shoemaker, J. K 259
Sotham, William H 302
Summers, Benjamin 304
Waite, James S 299
Waring, William J 259
Weller, Sidney 306
Weston, Eusebius 300
Grass, Bermuda 400
Buffalo 398, 400
Bunch 399, 400
Clover, Chilian 401
Crab or crop-grass 211
Foul meadow 211
Gramma 401
Guinea 400
Hay, &c 210
Lucerne 401
Muskeet or Mezquit 398
Orchard 396
Secretary 211
Timothy 211, 396
varieties of 211
Statement of Alexander, James 220
Bacon, William 217
Bee, V. M 220
Bowditch, Joseph 220
Brown, H. L 218
Buchanan, George 220
Burnett, Micajah 214
De Mott, James 218
De Neven, Gustavus 221
Evans, Isaac R 219
Fitch, John 219
Fulton, Daniel 214
Gross, Peter 220
Hart, T. L 212
Higgins, Anthony M 213
Iverson, B. V 212
Johnson, Samuel 214
Jones, Archibald 215
Keller, Joshua S 220
Lay, F. W 218
Macy, William M 219
McAllister, H. N 220
McClung, J. E 213
Phelps, William J 213
Shoemaker, J. K 220
Stabler, Edward 216
Waring, William J 220
Winship, Edwin 213
Young, John B 218
Grasses of United States, climatology of 395

Page.

Guano, statement of Bartlett, Levi 84
Bowditch, Joseph 89
Brumbaugh, David 81
Clopper, F. C 81
Comings, A. G 83
Fisher, George P 79
Keller, Joshua S 87
Lesley, John M 80
Linton, N 86
Parker, Joseph 88
Smith, Stephen H 88
Gypsum, statement of Bacon, William 82
Bartlett, Levi 84
Bowditch, Joseph 89
Comings, A. G 83
Eichar, John 88
Fitch, John 86
Linton, N 86
Parker, Joseph 88
Upton, jr., William 80
Webber, Samuel 85

H.

Hams, exports of 50
Hay, [see grass, &c.]
statistics of 211
Hemp, exports of 202
history of 200
Statement of Brown, H. L 206
Burnett, Micajah 205
Hughes, R 205
Jackson, W. M 206
Minor, James L 206
Hides, exports of 4
Hogs, [see swine.]
Hops, exports of 243
history of 242
Statement of Potter, C. E 243
Rouse, Lorenzo 245
statistics of 243, 244
Horses, exports of 27
introduction of 25
Statement of Alexander, James 34
Bowditch, Joseph 36
Brown, H. L 32
Buchanan, George 34
Burnett, Micajah 29
Crawford, Hon. E 28
Eichar, John 35
Franklin, Santarrilla S. G 34
Fulton, Daniel 30
Harris, Joshua 34
Higgins, Anthony M 28
Jarrett, Daniel 29
Johnson, Samuel 30
Keller, Joshua S 35
Knoop, Jacob 34
Lester, H. W 36
Macy, William M 34
Mallory, C. F 31
Maize, H. D 35
McAllister, H. N 34
McClung, J. E 28
Minor, James L 32

Page.

Horses, statement of Myers, M. F. 35
O'Hara, Armstrong 33
Parker, Joseph 36
Sampson, Thomas W 31
Shoemaker, J. K 34
Shourds, Thomas 33
Smoot, William 36
Upton, jr., William 30
Waring, William J 34
Wiborn, Gershom 33
Winship, Edwin 28
statistics of 27

I.

Indigo, exports of 255
origin and history of 255
statistics of 255
Insects, injurious to fruits 290, 291

L.

Labor, prices of at various periods 142
Land, improvement of 89
Statement of Asheton, Simon T 89
French, Henry F 90
Myrick, Elijah 89
Rowell, Elmar 94
Weller, Dr. Sidney 92
Lard, exports of 50
Lime, statement of Bacon, William 82
Eichar, John 88
Fitch, John 86
Higgins, Anthony M 80
Keller, Joshua S 87
Lesley, John M 80
Linton, N 86
Myers, M. F 87
Parker, Joseph 88
Upton, jr., William 80

M.

Meal, Indian, exports of 102
rye, exports of 154
Melons, history of 325
Statement of Goodrich, Chauncey E 326
Powers, Heman 325
Molasses, exports of 234
statistics of 233, 234, 235
Mules, exports of 27
introduction of 26
Statement of Alexander, James 34
Brown, H. L 32
Buchanan, George 34
Burnet, Micajah 29
Crawford, Hon. E 28
Eichar, John 35
Garth, D. C 33
McAllister, H. N 34
McClung, J. E 28
Minor, James L 32
O'Hara, Armstrong 33
Sampson, Thomas W 31

Page.
Mules, statement of Shoemaker, J. K. 34
Shourds, Thomas 33
Waring, William J 34
Williams, James 28
statistics of 27

N.

Nectarines, origin of 282
Notes, editorial 71, 181, 196, 229, 329, 342, 345, 347, 366, 386, 401
Nurseries 264

O.

Oats, history of 158
Statement of Bacon, William 160
Bowditch, Joseph 163
Brobst, Joseph 160
Burnett, Micajah 160
De Mott, James 162
De Neven, Gustavus 163
Dewey, Osman 163
Dyer, Raleigh W 163
Eichar, John 163
Fitch, John 161
Fulton, Daniel 160
Hurlbut, John 162
Jackson, W. M 161
Lesley, John M 159
Linton, N 162
Macy, William M 162
Miller, Admiral B 160
O'Hara, Armstrong 161
Phelps, William P 159
Spencer, Grove 160
Wiborn, Gershom 161
Yerkes, J. D 161
Young, John B 162
statistics of 159
Oil, colza and rape 226
linseed, exports of 202
Orchards, costs and profits of 264
manuring of 267
Osier, cultivation of 207
Ox, Brahmin, importation of 20

P.

Pea, cow 225
Japan 224
Oregon 223, 224
Peaches, origin and history of 282
Statement of Alexander, James 258
Boyd, S. S 284
Buchanan, George 258
Burnett, Micajah 284
Eichar, John 286
Goodrich, Chauncey E 285
Gross, Peter 286
Huntington, H. W 285
Little, Henry 285
McAllister, H. N 258
Robey, H. R 287
Shoemaker, J. K 258

Page.

Peaches, statement of Waring, William J 258
Wiborn, Gershom 286
Pears, origin and history of 277
Statement of Alexander, James 258
Asheton, Simon T 280
Boyd, S. S 279
Buchanan, George 258
Burnett, Micajah 279
Goodrich, Chauncey E 281
Little, Henry 279
McAllister, H. N 258
Myrick, Elijah 280
Preble, Abraham 279
Robey, H. R 281
Shoemaker, J. K 258
Waring, William T 258
Peas, history of 221
Statement of De Neven, Gustavus 225
Ernst, A. H 224
Holt, Richard E 224
Philips, M. W 225
Rozell, A. B 223
statistics of 222
Plums, origin and history of 257
Statement of Alexander, James 258
Asheton, Simon T 290
Buchanan, George 258
Burnett, Micajah 288
De Neven, Gustavus 292
Goodrich, Chauncey E 290
Huntington, H. W 288
Little, Henry 288
Mallory, C. F 290
McAllister, H. N 258
Myrick, Elijah 290
Robey, H. R 291
Shoemaker, J. K 258
Waring, William J 258
Pork, exports of 49, 50
Potatoes, common Irish, origin and history of 168
exports of 170
Statement of Asheton, Simon T 171
Bowditch, Joseph 174
Burnett, Micajah 170
Case, H. A 173
Dewey, Osman 175
Eichar, John 174
Fitch, John 173
Fulton, Daniel 170
Gillett, P. W 173
Goodrich, Chauncey E 172
Keller, Joshua S 174
Macy, William M 173
Myrick, Elijah 171
Parker, Horace 171
Powers, Heman 171
Schaeffer, George C 175
statistics of 169, 170
Potato, sweet, history of 169
disease, investigation of 175
Statement of Bailey, Luther 178
Brobst, Joseph 177
Goodrich, Chauncey E 178
Holt, Richard E 17
Miller, Admiral B 177
Minor, James L 178

Page.
Poultry and eggs, statement of Eichar, John 74
Poultry, statistics of 74, 142
Pruning 266

Q.

Quinces, origin and history of 295
Statement of Burnett, Micajah 295
Goodrich, Chauncey E 296
Little, Henry 296

R.

Rain, amount of, in temperate latitudes of North America 340
amount of, in temperate latitudes in Eastern continent 341
amount of, in 1853 at various stations in the United States 411, 412, 413
annual amount of, in United States for a series of years 405
annual fall of, in the cotton and sugar districts 360, 368
comparative distribution of, in temperate latitudes 339
permanence of, in France and Italy 384
Rape, culture of 226, 229
Rice, exports of 165
history of 164
Statement of Alston, Robert F. W 166
statistics of 165, 168
Rye, exports of 154
origin and history of 154
Statement of Cornish, Joseph 155
Dewey, Osman 155
Dyer, Raleigh W 156
Fitch, John 155
Winship, Edwin 155
statistics of 154

S.

Seed, clover, red 211
Sheep, exports of 38
introduction of 37
Statement of Andrus, Horatio N 42
Bartlett, Levi 44
Bowditch, Joseph 46
Burnett, Micajah 40
Case, H. A 45
De Mott, James 44
De Neven, Gustavus 47
Drisco, George W 41
Eichar, John 45
Gilbert, E. F 46
Harris, Joshua 45
Hart T. L 38
Higgins, Anthony M 39
Johnson, Samuel 41
Judson, Philander 47
Knoop, Jacob 45
Lester, H. W 47
Linton, N 45
Macy, William M 45
Mallory, C. F 42
Maynard, William S 42
Minor, Samuel L 43
Morris, Lewis G 44
O'Hara, Armstrong 43
Parker, Joseph 46
Price, Henry M 47

Page.

Sheep, statement of Sampson, Thomas W 43
Upton, jr., William 40
Wiborn, Gershom 44
Winship, Edwin 40
Yerkes, J. D 42
Young, John B 44
statistics of 38
Ship bread, exports of 128
Silk, history of 77
statistics of 78, 79
Skylarks 70, 73
Snuff, exports of 238
Squirrel, ground or prairie 68
Sugar, beet root 233
Statement of Champomier, P. A 235, 236
cane, climate of 356
exports of 234
geographical range of 232, 356
history of 231
statistics of 234, 235
temperature, limits of 358, 369, 370
maple, statistics of 233, 234
Super-phosphates, statement of Bacon, William 82
Bartlett, Levi 84
Comings, A. G 83
Swine, exports of 49, 50
introduction of 48
Statement of Bartlett, Levi 54
Bowditch, Joseph 58
Burnett, Micajah 51
Cooke, William H 55
Dyer, Raleigh W 58
Eichar, John 57
Garth, D. C 54
Gross, Peter 57
Harris, Joshua 56
Hart, T. L 50
Jackson, W. M 54
Keller, Joshua S 57
Knoop, Jacob 56
Macy, William M 57
McClung, J. E 51
Minor James L 53
Morris, Lewis G 55
Morton, W. T. G 52
O'Hara, Armstrong 54
Payne, William S 51
Phelps, William J 51
Price, Henry M 58
Sampson, Thomas W 53
Smoot, William 58
Upton, jr., William 52

T.

Tallow, exports of 4
Temperature of North America, in temperate latitudes 332
of Eastern continent, in temperate latitudes 333
of 1853 compared with constant means 410
Temperatures favorable to the growth of cotton 358, 369, 370
Indian corn 349, 350, 354
sugar cane 358, 369, 370
tobacco 386
the vine 375, 376, 378, 379, 382
wheat 393, 395
highest in the United States 432
lowest in North America 349, 350, 351

Page.

Temperatures, mean summer, for a series of years in the United States 406
monthly, in 1853, at various stations in the United States 413, 414, 415
Thermometer, mercurial, history of 329
Thread, linen, exports of 202
Tobacco, exports of 238
geographical range of 386
origin and history of 236
Statement of Brown, H. L 242
Cornish, Joseph 241
Garth, D. C 242
Minor, James L 241
Nevinger, D 242
Phelps, R. H 239
Varden, John 241
Winship, Edwin 241
statistics of 237, 238, 239
temperature favorable to the growth of 386

V.

Vegetation, vertical temperature range of 421, 422
Vine, geographical range of 372, 385
history of 296
notes on the cultivation of 382
Statement of McAllister, H. N 259
[For other statements, see Grape.]
Temperatures favorable to the growth of in the United States 375, 376, 385
Vinegar, exports of 261

W.

Wax, exports of 75
statistics of 75
Wheat, exports of 128
geographical range of 388
origin and history of 126
prices at various periods 142
Statement of Atkins, Howard M 132
Alexander, James 147
Armstrong, James 152
Bailey, Luther 145
Bartlett, J 131
Beyerle, H. J 149
Blake, Darius 150
Brown, H. L 136
Brumbaugh, David 132
Buchanan, George 147
Burnett, Micajah 131
Carpenter, J. A 153
Case, H. A 147
Cooke, William H 137
De Mott, James 143
De Neven, Gustavus 152
Dewey, Osman 150
Durley, James 153
Dyer, Raleigh W 151
Eichar, John 150
Evans, Isaac R 147
Evans, John W 146
Fitch, John 141
Franklin, Santarrilla S. G 145
Fulton, Daniel 132
Gardiner, Collins 137
Gillett, P. W 146
Gross, Peter 149
Harris, Joshua 144
Higgins, Anthony M 120
Hurlbut, John 144

Page.

Wheat, statement of Jackson, W. M. 135
Jarrett, Daniel 130
Knoop, Jacob 146
Lay, F. W. 138
Lesley, John M. 130
Macy, William M. 146
Maize, H. D. 149
Mallory, C. F. 133
Maynard, William S. 133
McAllister, H. N. 147
Minor, James L. 134
O'Hara, Armstrong 137
Payne, William S. 130
Powers, Heman 139
Rounsville, J. P. 137
Sampson, Thomas W. 134
Shoemaker, J. K. 147
Spencer, Grove 133
Spiny, John 130
Waring William J 147
Watts, James H. 138
Wiborn, Gershom 140
Yancy, Charles 150
Yerkes, J. D. 133
Young, John B. 143
statistics of 128, 129
temperature favorable to the growth of 393
Wine, currant 300
history of 297
Statement of Crawford, Hon. E 299
Marshall, A 305
Minor, James L. 301
Munch, Frederick 302
Pike, Nicholas 311
Robey, H. R 306
Sotham, William H 302
Summers, Benjamin 304
Weller, Sidney 306
statistics of 256, 298, 309
Wool, exports of 38
Statement of Andrus, Horatio N 42
Bowditch, Joseph 46
Brown, H. L. 43
Burnett, Micajah 40
Case, H. A. 45
De Mott, James 44
De Neven, Gustavus 47
Eichar, John 45
Hart, T. L. 38
Higgins, Anthony M. 39
Johnson, Samuel 41
Judson, Philander 47
Knoop, Jacob 45
Lester, H. W. 47
Linton, N. 45
Macy, William M. 45
Mallory, C. F. 42
Maynard, William S. 42
Minor, James L. 43
Morris, Lewis G. 44
Parker, Joseph 46
Price, Henry M. 47
Upton, jr., William 40
Wiborn, Gershom 44
Winship, Edwin 40
Young, John B. 44